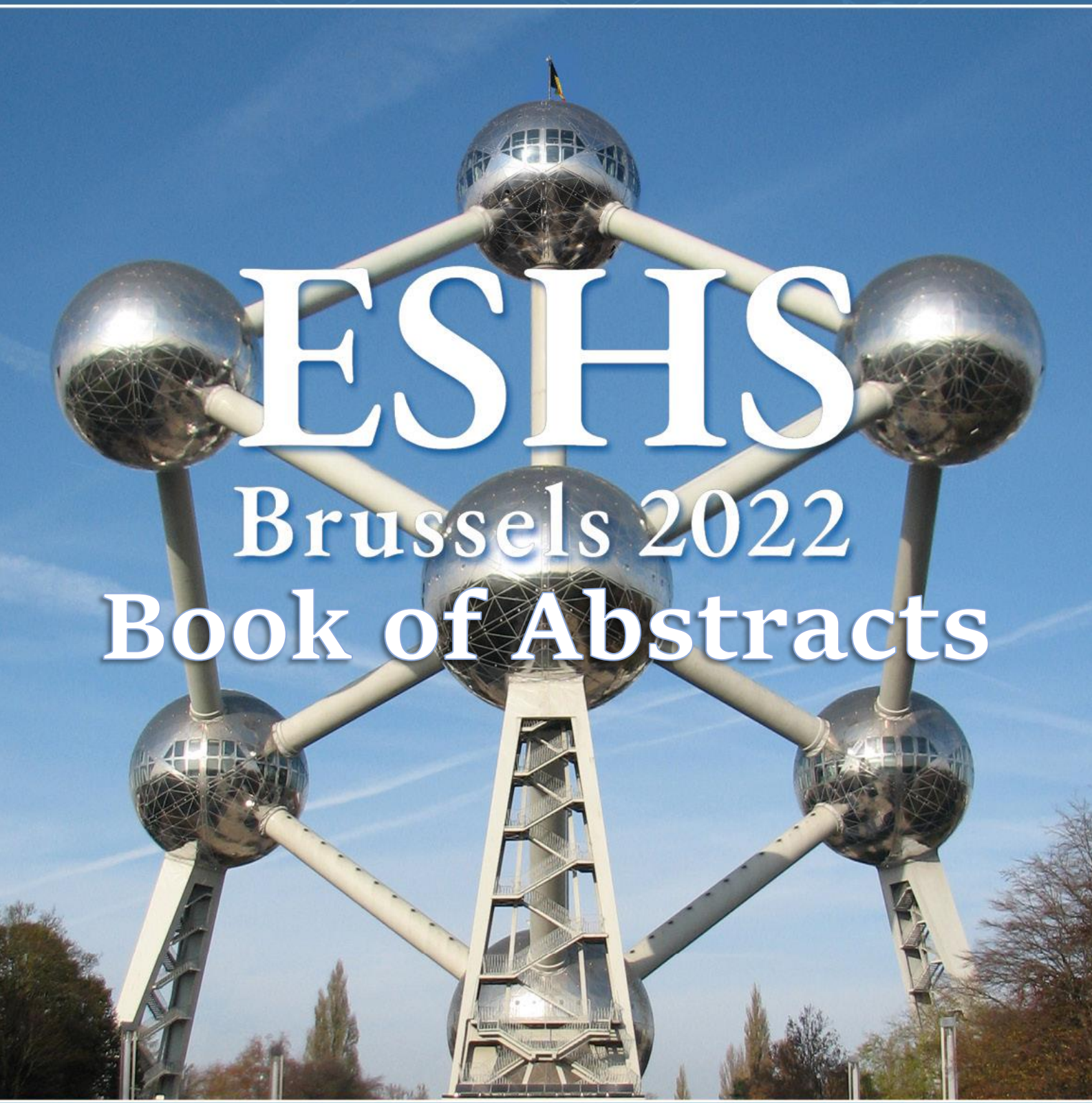
10th Conference of the European Society for the History of Science

7 - 10 September 2022



ESHS

Brussels 2022

Book of Abstracts

VRIJE UNIVERSITEIT BRUSSEL

National Committee for Logics, History and Philosophy of Science

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10th Conference of the European Society for the History of Science
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PROGRAM OVERVIEW

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Detailed Overview by Day

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Saturday 19:30 – Closing of the ESHS Brussels 2022 Conference

Abstracts and Summaries

Wednesday 7

11:00-12:30 - Early Career Scholars Network Event

Room: **K (auditorium La Fontaine)**

The ESHS Early Career Network, GEWINA – Belgian-Dutch Society for the History of Science and University and the Science History Institute co-host a networking round table for early-career researchers in the history of science, universities, and knowledge in general.

Short introduction by
- Alexia Coussement, Ph.D. Candidate at Power in History - Centre for Political History (University of Antwerp) for Gewina
- Dr Charlotte A. Abney-Salomon, Director, Beckman Center for the History of Chemistry, for the Science History Institute

Presentation of the ESHS Early Career Network
- Dr Monique Palma, Post-Doctoral Fellow at CIUHCT, NOVA School of Science and Engineering Lisbon and Representative of the Early Career Network of the ESHS
- Dr Alexander Stöger, Post-Doctoral Fellow at Leiden University and Representative of the Early Career Network of the ESHS

13:00-13:30

Welcome and Introduction to the ESHS Brussels 2022 Conference

Room: **K (auditorium La Fontaine)**

Chair: Kenneth Bertrams (ULB) and Steffen Ducheyne (VUB)

Welcome by Professor Marius Gilbert, Vice-Rector for Research of the Université Libre de Bruxelles

Dr Thomas Dermine, Secretary of State for Economic Recovery and Strategic Investments, in charge of Science Policy

Dr Brigitte Van Tiggelen, Science History Institute and co-chair of the ESHS Brussels 2022 Steering Committee

Professor Theodore Arabatzis, ESHS President

13:30-15:00 - *Plenary Lectures*

Neuenschwander Prize 2020 Lecture

Room: **K (auditorium La Fontaine)**

Chair: Ana Simões and Erwin Neuenschwander

"The Sisyphean Fate of Historians of Science"

–Kostas Gavroglu

The Sisyphean tale is often thought of as the punishment which expresses the perpetuity of pointlessness: Sisyphus cannot put the boulder on the hill, since every time it reaches its destination, it tumbles back, and Sisyphus is obliged to push it uphill again. This part of the Sisyphean tale is known to almost everyone. What, however, is not known is what caused the outrage of the gods to give him such a punishment. Sisyphus having gone to the underworld, managed to trick death not once but twice, and succeeded to return to our world. He, thus, gained fame for his trickery and intelligence and Homer referred to him as the "most cunning of men". But the gods could not tolerate a human to be more cunning than themselves, they thought this was a wrong message to the rest of the humans, and so they punished Sisyphus.

History of science during its 150 year history, just like Sisyphus, has managed to trick death twice.

For many decades almost all scholarship produced in history of science was intended for an audience of scientists. But decades of the most sophisticated scholarship, was met by benign neglect on the part of the scientists. It was not an insignificant part of the community of historians of science who time and again raised the question "who are we writing for", "who is listening to us", "who is reading what we write", "what effect our findings are having on the education of scientists"… The answers to these questions were depressingly clear and the work of historians of science was repeatedly confused by the scientists as either being philosophy or some kind of popularization of past scientific achievements. Our community's attempts to talk to scientists and to engage them in our discussions, came to a dead end. Facing the insistent rejection of its intended audience did not provide any heartwarming prospects for the survival of our discipline. Yet, despite being mistaken for philosophy or popularization, despite the passive stance of the scientists towards it, history of science managed to trick death, by slowly and painstakingly creating its own audience.

However, our relations with the scientists is an evolving relationship, and, thus, it is, indeed, a pressing issue to provide some answers as to "who is reading what we write."

Plenary lecture ESHS President-Elect 2020

Room: **K (auditorium La Fontaine)**

Chair: Ana Simões

"History of Science and its Interlocutors in the Humanities"

- Theodore Arabatzis

From the early days of its professionalization, in the aftermath of the 2nd World War, the history of science has been seen as a bridge between the natural sciences and the humanities. However, only one aspect of this triadic nexus, the relations between the history of science and the natural sciences, has been extensively discussed. Another aspect, the relations between the history of science and the humanities, has been less commented upon. With this talk I hope to make a small step towards redressing this imbalance, by discussing the relationships between the history of science and two other humanistic

disciplines that have been historically and institutionally associated with it: the philosophy of science and general history. I will argue that both of these relationships are marked by the characteristics of an unrequited friendship: on the one hand, historians of science have ignored, for the most part, calls of collaboration from their philosopher colleagues; and, on the other hand, historians specializing in other branches of history have been rather indifferent, again for the most part, to the efforts of historians of science to understand science as a historical phenomenon. I will attempt to offer a diagnosis of this regrettable situation and some suggestions for overcoming it.

15:30 – 18:00 - *Plenary Lectures*

Early Career Lecture 1

Room: **K (auditorium La Fontaine)**

Chair: Roberto Lalli

"Data Stories: Satellites, History, and the Making of a Digital Climate"

- Gemma Cirac-Claveras

Our current understanding of what climate is (including its changes and its policy implications) relies enormously on data provided with remote-sensing satellites orbiting the Earth. What do we know exactly about how this data is generated, shared, maintained and used -and about the implications of satellite data production infrastructures in making climate knowledge?

Just like all forms of data, satellite data are cultural artefacts, historically situated and profoundly marked by the institutional configurations and socio-technical arrangements from which they emerge. They form the nexus of various economic, diplomatic, regulatory, scientific and communication interests, whose practices, dynamics and configurations are still unexplored.

In this talk, I will suggest to use the history of satellite data production, circulation and use in order to better understand the recent history of climate science and policy -what I tentatively call Digital Climate. Ultimately, this talk is an invitation to reflect on what happens when we take scientific data seriously and put it into historical consideration.

Early Career Lecture 2
Room: **K (auditorium La Fontaine)**

Chair: Simone Turchetti

"Ocean Science Diplomacy: The History of a Fluid Concept"

- Sam Robinson

Science Diplomacy as a concept of geopolitics has exploded over the past 15 years. But the vagueness of its history and evolution of its use - by practitioners and politicians and scholars - has made this fluid concept difficult to contain.[1] The claims to historical precedent for Science Diplomacy made in the oft cited Royal Society/AAAS 2010 Report into Science Diplomacy provides no actual details of what that history might be.[2] In my talk, I will explain why historians of science must engage with this practice and the misunderstanding and appropriation of a concept that is nevertheless shaping international science and diplomacy in the 21st century. The unsubstantiated historical claims made in the Royal Society/AAAS report reinforce the vagueness of the concept itself, allowing for practically every past international scientific endeavour to be retrospectively co-opted as Science Diplomacy. Without a nuanced understanding of the history of both the positive and negative antecedents of this concept, Science Diplomacy risks losing its legitimacy as a tool for tackling global challenges collectively and openly.

It is the argument of this lecture that Science Diplomacy as we know it today was fundamentally shaped not by scientific developments alone but by the wider global changes that took place in the first decade of globalisation: the 1970s.

Early Career Lecture 3
Room: **K (auditorium La Fontaine)**

Chair: Maria Paula Diogo

"From Transport to Mobility: Alternatives, Resistance, Justice, and the Mobilization of the History of Science and Technology"

- M. Luísa Sousa

Crossing history of mobility with the history of science and technology is a fruitful way to rethink one of today's "grand societal challenges": people's mobilities and immobilities. Shared key topics range from socio-technical systems, to the making and circulation of knowledge and ignorance, and its spatial co-shaping, the role of experts, lay experts, mediators, activists, and users, to the technoscientific and cultural politics of mobility.

Working on these topics, in the past 20 years historians – and particularly of science and technology influenced by the mobilities studies – have reshaped the traditional field of history of transport, calling for a mobility history that includes the relations between different forms of mobility (e.g. walking, cycling, public transit, automobility), that is more transnational, and with a greater emphasis on the lenses of technology, on techno-scientific expertise, and on the technologies in use. Recent pleas have been made for looking historically at present-day "mobility justice" issues at an inter-scalar perspective, framing intersectional questions, and urban, migration, and planetary crises. In this sense,

[1] The Royal Society in its 2010 report (see note 2), stated that "'Science diplomacy' is still a fluid concept that can usefully be applied to the role of science, technology, and innovation in three dimensions of policy:

- informing foreign policy objectives with scientific advice (science in diplomacy);
- facilitating international science cooperation (diplomacy for science);
- using science cooperation to improve international relations between countries (science for diplomacy)."

[2] The Royal Society (2010) 'New frontiers in science diplomacy. Navigating the changing balance of power' https://royalsociety.org/topics-policy/publications/2010/new-frontiers-science-diplomacy/

these crossings offer a fecund dialogue with concepts such as “usable past”, the ”Anthropocene” and “sustainability”.

Drawing on these historiographical developments, the on-going research project “Hi-BicLab. History Lab for Sustainable Urban Mobilities: Lisbon's cycling policies” aims at mobilising history for academic and non-academic audiences, engaging them in historical thinking for identifying key socio-cultural-technical factors that have shaped how people moved (and did not move) and how these might suggest ways to intervene in the present to promote more sustainable and inclusive urban mobilities.

18:00- 20:00 - *Welcome Reception*

Room: **Hall des Marbres**

Thursday 8

09:00-10:30 - Plenary Lectures

Neuenschwander Prize 2022 Lecture

Room: **K (auditorium La Fontaine)**

Chair: Theodore Arabatzis and Erwin Neuenschwander

"Orientations and Disorientations in History of the Sciences"

- Simon Schaffer

Historians of the sciences have paid great attention to the ways faith in what has been called the quantitative spirit emerged as a dominant feature of the politics of science, a theme of obvious salience in current epidemiological and climate crises. There may be connexions between measurement practices and orientation towards other cultures - as though scientific modernity somehow emerged through robust quantification's primacy over subaltern, past and exotic worlds, where merely provisional judgment allegedly still operated. This highly simplistic orientalist distinction accompanied assumptions that the remote was best understood as the ancient, a viewpoint common at the same late enlightenment moment as the apparent institutionalisation of the regime of the exact sciences within European polities. Under this regime, precision surveys - the way the state saw - have often been understood as integral for European societies and even more so in colonised territories. This version of what might be called metrological orientalism can be disoriented through excellent recent scholarship that explores complex entanglements of measurement practices circulating across very different scientific cultures; and that shows how precision devices that claimed merely to represent phenomena often helped produce them. Studies of select cases of relations between European practitioners and indigenous experts, in fields such as Egyptian hydraulics or Indian astronomy, can reveal even more: the role that judgment and exactitude played in forging very different, politically significant, versions of the past history of the sciences. These disorientations can aid novel forms of historical understanding of the politics of science.

Plenary Lecture ESHS President-Elect 2022

Room: **K (auditorium La Fontaine)**

Chair: Theodore Arabatzis

"The Fictional Politics of Scientific Collaboration: Solomon Houses in Early Modern Europe"

- Dana Jalobeanu

In the past decades, scholars generally agreed that Francis Bacon's model-society for the production of knowledge – Solomon's House, as depicted in the fable of the *New Atlantis* – constituted a sort of blueprint, or at least an imaginary reference for the newly formed scientific societies of the Early Modern Europe. In this talk I would like to both question and qualify this general agreement. I argue, first, that Bacon's fable provided not so much a blueprint for actual scientific societies, as an incentive for the production of a new genre: stories and fables depicting emblems of knowledge-production and collaborative learning. Second, I show that several such stories which claim to be continuations of the *New Atlantis* read, in fact, as interpretations of it, contextualizing the Solomon House model to different institutional settings of the late seventeenth, eighteenth and even nineteenth century. Third, and perhaps more important, I discuss the general appeal of these early modern stories of science, knowledge production and the advancement of learning. My main claim in this talk is that these fables and stories of science constitute an intrinsic element of the institutional set-up of science in modern world. They offer alluring and imaginative models of collaboration. Models which, perhaps, are still interesting and useful today.

11:00-13:00 - *Sessions*

3 - Genes, Ghosts, and Icons: Networks of (Amateur) Scientists and the Conservation, Collection, and Circulation of Animals in the Turbulent 20th Century

Room: **AY.2.107**

Organiser: Simone Schleper

Chair: Leo Chu

Session Abstract:

Scientific and public interest in animals depends heavily on the species' categorization as rare, threatened, or culturally (un)desirable. Such classifications are not alone bound to change over time. They are closely entangled with the professional and disciplinary aims of epistemic communities in the life sciences. In this session, we, the members of the NWO Vici project 'Moving Animals: A History of Science, Media and Policy in the Twentieth Century', investigate the ways in which animals, their representations, and their categorizations have been used in the professional and personal self-fashioning by naturalist networks.

During the 20th century, branches in the life sciences dealing with animals went through several phases of professionalization and disciplinary formation. These included the rise of ecology in the 1950s and 1960s and the emergence of modern genetics for biodiversity research in the 1970s and 1980s. At the same time, the geopolitical context of zoological networks and their members, who often conducted their research abroad, radically changed with the decolonization of formerly European controlled territories on the African continent, and the rise and the end of the Cold War. In this session we critically examine how (amateur) scientists made use of popular imagery, emergent methods, and, in some cases, the absence of counter evidence, to manifest their expertise in times of political and disciplinary change.

The cases discussed in this session range from cryptozoology, to invasion biology, extinction ecology, and animal tracking. For all cases, we highlight the roles of animals, animal representations and categorizations in the development of the respective fields. We moreover demonstrate how the politics of self-fashioning played into the popular understandings of species

Animal-Catching and Cryptozoology: On Charles Cordier's Economy of Hidden Animals

- Raf de Bont

In the period between the 1940s and the 1970s, the Swiss Charles Cordier (1897-1994) was one of the best-known and most active animal-catchers working for zoos. Travelling through Belgian Congo, Bolivia and Costa Rica, he provided rare animals such as gorillas, flamingos and hummingbirds to reputed zoological gardens in San Diego, New York, Antwerp and Zurich. Alongside his animal-catching activities, Cordier held ambitions to contribute to 'cryptozoology' – the 'science of hidden animals' that sought evidence for the existence of creatures only known from myths and folklore. Inspired by the writings of cryptozoology's 'founder' Bernard Heuvelmans, Cordier, for instance, invested heavily in tracking 'apemen' and 'sirens' in the interior of the Belgian Congo. He chased such 'mythical' creatures with the same intensity and through the same means as he did Bongo antelope or Congo peafowl.

In my paper, I will explore the common logic of Cordier's animal-catching and cryptozoological activities by looking into the skills, networks and scientific ambitions involved in both. Furthermore, I will show how both activities changed meaning and power in the mid-twentieth century when colonial empires collapsed and zoos reorganized with an eye on conservation. Working from the margins of networks of powerful institutions, Cordier's work proved both exploitative and precarious. It is in this light, I argue, we have to

understand the successes he achieved in the economy of hidden animals, but also his eventual fall from grace.

Averting Extinction: The Emergence of Genetic Management of Small Captive Populations of Wildlife and the Case of the Przewalski's Horse (Equus Przewalskii))

- *Monica Vasile*

This presentation examines the emergence in the 1970s U.S. of a scientific field aimed at the recovery of small endangered populations threatened by inbreeding and low genetic diversity, and focuses on scientific debates around the captive-breeding of the Przewalski's horse.

In the 1960s, it became increasingly clear that many species tethered on the brink of extinction but conservation science was in its infancy and conservationists swam in a sea of unknowns. An envisaged solution to imminent extinctions was captivity – managing the remaining individuals under human care in zoos until potential return to the wild. Yet, this solution was questioned: can small captive-bred populations be viable? At that time, the Przewalski's horse was a success story of how species extinct in the wild can survive in zoos. Its captive history was one of the longest in the world, and one of the best documented. The uniquely complete records of the horse played a role in the emergence of a science meant to improve captive propagation and save species from extinction. Data analyses in the 1970s turned the horse from a celebrated success into a worrisome case of inbreeding and reduced genetic diversity, which demonstrated the urgency to improve the management of zoo collections. This controversial discovery was fueled initially by 'amateurs', who, external to the world of science, conservation or zoos, struggled to scientifically demonstrate their claims. In connection to this, a cluster of scientists set out to deepen and widen the analysis to other species, generating a scientific field.

The Ruddy Duck in Europe: A Case of Late-20th Century Invasive Species Control

- *Vincent Bijman*

In the early 1980s, the Ruddy Duck (Oxyura jamaicensis), one of six stiff-tailed duck species, was for the first time noticed on the shores of southern Spain, hybridizing with the globally threatened White-headed Duck (Oxyura leucocephala). This hybridization was perceived as undoing a multi-year conservation programme for the protection of the White-headed duck at the Doñana National Park, since the Ruddy Ducks and White-headed Ducks had hybrid offspring. These Ruddy Duck originated from the UK, where they were introduced from the United States in the 1950s by the conservationist Peter Scott and had escaped his Slimbridge Wetland Centre. The Ruddy Duck case became regarded as a flagship global conservation and biodiversity issue in the years to come. A coalition of British and Spanish conservationist was formed, and succeeded in convincing national governments and an international community of conservationists to organize the European eradication of the Ruddy Duck. In my paper, I draw from a variety of primary and secondary sources consisting out of scientific publications, action plans, working group minutes and semi-structured interviews and develop a theoretical framework based on actor-network theory. The hybridization conflicted with established conservation values and notions of genetic purity, and the Ruddy Duck became newly represented as a problematic invasive. Furthermore, this case allows me to analyse how a variety of stakeholders negotiated an intricate set of practices to contain the Ruddy Duck invasion. The Ruddy Duck itself played a crucial role in this network, since its particular behaviour allowed for effective control by shooting.

Victims and Diplomats: White Storks and Images of Expertise in Postwar Ornithology
- Simone Schleper
Currently, the European white stork (ciconia ciconia) is listed on the Red List of Endangered Species by the International Union for Conservation of Nature (IUCN) in the category 'least concern'. The low urgency is however a recent development, resulting from European breeding programs and a slow recovery after a period of steep decline observed since the early postwar years in both eastwards and westwards migrating storks. In fact, by the 1970s the decline of the white stork was recognized as a Europe-wide problem.
In this paper, I discuss two approaches to save the European white stork populations from extinction that emerged after 1980. Despite the shared objective to devise transnational, science-based conservation measures, the two approaches' geographical focus was radically different. Projects by the World Wildlife Fund and the International Council for Bird Preservation focused firmly on the stork's wintering areas on the African continent. Interventions by a second group of ornithologists at the Max Planck Institute for Ornithology in Radolfzell concentrated on the Middle East as a migration bottleneck. Based on archival research, interviews and correspondence with involved ornithologists, the paper examines stork representations as an important lens for investigating the professional politics of ecology and conservation. It shows that representations of white storks, the birds' ecology, and derived conservation hotspots became part of the boundary work used by European ornithologist in the creation of changing scientific and institutional identities.

19 - Science and Infrastructures of Empire
Room: **AY.2.114**

Organiser: Sarah Qidwai

Chair: Sarah Qidwai

Session Abstract:
The expansion of imperial interests and the development of various scientific disciplines has been inscrutably linked in histories of science. During the long nineteenth century, various scientific disciplines were intellectually and institutionally transformed, which included the development and formalization of said disciplines. Although there had been links between science and imperialism before this period, these shifts contributed to the expansion of imperial interests. Thus, various scientific disciplines were engaged with building the infrastructure for colonial empires. This panel takes a transnational and interdisciplinary approach to the topic and investigates the politics of science through the lens of infrastructure. Building on themes in recent publications, this panel seeks to address the question of infrastructure – the systems that supported and sustained imperial networks - Who was a part of these projects? How do we incorporate this theme into the existing historiography? The papers in this panel offer new geographic and thematic examples to the growing field of science and empire. We cover a diverse range of themes from various different geographic vantage points. This includes German astronomical expeditions, Leiden Observatory's search for a Southern Station, animal infrastructure in Johannesburg, and geological surveys in British India. This transnational and interdisciplinary context presents future directions for studies in science and empire.

Securing the Southern Skies: Astrophotography and Leiden Observatory's Search for a Southern Station

- Chaokang Tai

The daily lives of professional astronomers drastically changed with the introduction of photography around the turn of the twentieth century. With photography, it became possible to split the act of observing the night sky and transcribing these observations, which hitherto had to be performed simultaneously. This allowed for a new division of labour between astronomers who obtained photographic plates and astronomers who measured these plates. Because plates could be stored and transported, these astronomers no longer had to work at the same physical location, enabling a global division of labour among astronomical institutions. Relying on colonial infrastructures, photographic plates were often obtained in the Global South and then shipped to the Global North for measurement and reduction, reflecting contemporary assumptions of what was considered the more important aspect of astronomical research. How such collaborations were established will be illustrated through the case of Leiden Observatory's search for a Southern Station. Their initial plan was to turn a new-to-be-built observatory near Lembang in the Dutch East Indies into a subsidiary for Leiden, but, as I will show, this was plan was thwarted by local financers, who managed to secure independence for the new observatory. Instead, Leiden managed to secure an agreement with the Union Observatory in Johannesburg, whereby Leiden astronomers could observe in the southern skies while Union students could spend time in Leiden as part of their education.

German Astronomical Expeditions as Users and Builders of Infrastructure

- Katharina Bick

For astronomical expeditions, large amounts of heavy and fragile equipment needed to be transported; local time and the precise location of a station had to be known; and prospects of clear skies needed to be assessed. Conversely, the expeditions fed new longitude determinations into existing geographical knowledge and their journeys to destinations rarely visited by Europeans were an opportunity to scout new waters. These examples demonstrate an important area of interaction between science and empire: infrastructure. Infrastructure was instrumental for European imperial undertakings, because it made colonial rule possible and less risky. At the same time, the Europeans powers built a sense of technological and hence moral superiority from their infrastructure, which they in turn used to ideologically justify colonial rule.

In my talk, I will take a closer look at the multifaceted interrelations between science, infrastructure and empire through the case of German astronomical expeditions. Drawing on examples from the German expeditions to observe the transits of Venus in 1874 and 1882 and the solar eclipse expeditions organized by Hamburg Observatory in the early 20th century, I will illustrate how astronomical expeditions relied on imperial infrastructure – like means of transportation, time services, and meteorological information – and at the same time contributed to their extension. By looking at infrastructure, my talk will highlight the connections between German astronomical expeditions and the imperial undertakings of several nations.

Geological Surveys and the Expansion of Colonial Empires

- Sarah Qidwai

In November of 1850, the Irish geologist Thomas Oldham (1816-1878) left his position as the Chair of Geology at Trinity College, Dublin to take up the post of the first Superintendent of the Geological Survey of India (GSI). The survey, formed in 1851 by the East India Company (EIC), was responsible for mapping some of the key geological structures and rock types in India, but Oldham's aim was to find and map out coal mines.

It is well documented that in the first half of the nineteenth century, conservative geologists in both Britain and America attempted to reconcile new discoveries in the field of geology with their own worldviews. Of course, we have a firm understanding of the debates among geologists and the contributions of key figures such as Charles Lyell, but what about developments taking shape in other corners of the British Empire? In this paper I will examine the early years of the GSI and argue that that geological findings were entangled with aims of the EIC and ultimately the British Empire.

Comment : Edward Gillin

22 - Science Policies and Scientific Collaboration - 1

Room: **AW.1.121**

Organiser: Luca Guzzardi

Chair: Gerardo Ienna

Session abstract:

The notion of scientific collaboration has raised much interest among scholars of different disciplines and backgrounds, including history and philosophy of science, social epistemology and sociology of science, scientometrics, and science policy. Particularly in the last decades, collaborative approaches became crucial in order to attain substantial results in practically all domains of science. However, while they have clear advantages in terms of expected and achieved outcomes, they also raise concerns on their own. Indeed, collaboration requires that the actors involved — no matter if individual researchers or institutions — adopt coordinated policies for research, e.g., agreeing on the goals and scope of research projects, deciding how to share risks and recognition for results, or stipulating criteria for ownership of inventions and discoveries. All these aspects of framing and managing collaboration may generate tensions between the collaborating parties and, accordingly, stimulate the negotiation of collaboration policies to deal with them.

The symposium “Science policies and scientific collaboration 1” explores the rise and relevance of collaboration throughout the history of the natural and the social sciences. Comparing case studies from diverse fields and historical periods, it aims to discuss if collaboration is not but a recent phenomenon and whether general patterns of collaboration exist, how collaborative practices are internally shaped by epistemic and non-epistemic norms and standards, and what conditions promote or hinder collaboration.

Domain-specific Explanatory Norms and Scientific Collaboration

- Chiara Lisciandra

This paper contributes resources from the history and philosophy of science to identify differences between explanatory norms across disciplines and how such differences affect scientific collaboration. Explanatory norms are the *implicit* and *explicit* rules that govern what scientists consider to be explanatory sound. Examples are generality, tractability, precision, etc. Explanatory norms are *domain-specific* insofar as certain domains tend to praise some norms over others, for instance a domain may favour tractability over generality; and even when different domains endorse the same explanatory norm, such as generality, they may have different standards for what counts as an adequate level of compliance with that norm (Marchionni 2013; Woody 2003). The body of literature on explanatory norms is rapidly growing. However, there is still no consensus on a theoretical framework that allows us to compare norms across disciplines in a systematic manner. The aim of this paper is to provide such a framework and use it i) to measure distance between explanatory norms; and ii), to predict patterns of collaborative work

accordingly. By pursuing these goals, this work promises to be theoretically significant and practically relevant. It contributes to the work on domain-specific explanatory norms; and provides recommendations for science-policy assessment of collaborative science. This way, it shows the importance of grounding the design of institutional factors in history and philosophy of science work.

References

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The Rise of Multi-messenger Astrophysics between Coordination and Collaboration

- *Luca Guzzardi*

Multi-messenger astrophysics (in short, MMA) is an emergent approach that combines information from different "messenger" signals — electromagnetic radiation at multiple wavelengths, neutrinos, cosmic rays, and gravitational waves — generally coming from distant regions of the Universe to explore the potential sources that have released those signals. It is essentially based on several stations covering each a particular messenger, sharing their data, and possibly broadcasting "warnings" to each other when a significant signal is detected. After receiving the warnings, participants may carry out follow-up analyses, identify the possible sources, and predict the emission of other messengers. Particularly in the recent years, with the development of neutrino and gravitational waves astronomy, this appears a promising strategy to contribute novel knowledge about processes that are crucial for the understanding of galaxies formation and evolution, such as black holes and neutron stars mergers. Notwithstanding its success, the status of MMA as a collaborative enterprise appears critical and may raise some concerns. A crucial question seems to be whether the results of a certain joint course of action — e.g., the 2017 multi-messenger detection of gravitational waves from a neutron stars merger — is just matter of coordination among individual teams that in principle could claim for priority in a discovery or should be viewed as the outcome of a collaboration (joint action) among "formal collaborations". To cope with this question, in the present paper I briefly outline the history of MMA and analyze the policies and memoranda of understanding of multi-messenger enterprises in astrophysics.

Growth and Diversification of Research Topics: 30 years of Climate Change Research

- *Carlo Debernardi*

The goal of this article is to increase our understanding of how research on a given theme expands and diversifies by considering the case of research on climate change, a pivotal challenge of our times and one of the most important and fast-growing research themes in modern science. The analysis considers more than 200.000 articles published from 1990 to 2020, and exploits a methodological and a conceptual innovation. First, we use a state-of-the-art technique to identify research topics, overcoming some of the major limitations of the main topic modelling approaches. Second, we conceptualize two micro-level modes of growth and diversification, which describe how scientists start to publish on given research theme or specific topics, either autonomously (i.e. "germination") or with co-authors who have already published on the theme/topic (i.e. "collaboration"). We employ this micro-level lens also to study macro-level trends, namely the changing relationship between countries and fields in the generation and development of new topics. With a rather fine-grained level of analysis, we identify more than 800 research topics. Most of these were established in countries leading the scientific production - namely US, Canada, Japan and European countries - within the early 2000s. At the same time, we find that new topics are increasingly developed in emerging countries, and that both germination and collaboration play a key role in the diffusion of research topics.

Michel Serres and the Groupe des Dix

- *Massimiliano Simons*

Michel Serres is often seen as an example of how (French) philosophers work on their own and 'have no master'. However, during the 1970s, he did participate actively in an interdisciplinary collaboration known as the Groupe des Dix (Group of Ten). The Group of Ten originated in 1968, and consisted originally of ten members from very different backgrounds, ranging from neurobiology, economics to sociology. Throughout the years many other members joined, including Serres in 1973. The initial ambition of the group was to mobilize new developments surrounding themes such as complexity and self-organization to rethink society and politics. Their ambition was thus explicitly political.

In this paper, I aim to retell the story of this forgotten collaborative project, which eventually deteriorated in 1976. This for several reasons. First of all, it shows how even philosophers who claim to work in an individual and isolated fashion, such as Serres, often still participate in collaborations. Secondly, the Group of Ten highlights an interesting case of an interdisciplinary collaboration, between social scientists, natural scientists and politicians, worth exploring. Thirdly, the explicit aim of the group was not just to do research, but also to have policy impact. Finally, the project failed and it is worthwhile to investigate the reasons why it did fail. It that sense, the Groupe de Dix can offer us an alternative picture of what the role of the scientist can be for making policy, and why this is often a tricky business.

35 - Science Diplomacy and Politics - 1

Room: **H.1.302**

Organisers: Matthew Adamson & Doubravka Olšáková

Chair: Sam Robinson

Session Abstract:

The core literature on science diplomacy has long contended that turning to science in the diplomatic arena opens opportunities to go beyond political differences and tensions (e.g. AAAS/Royal Society, *New Frontiers of Science Diplomacy*, 2010). Recent historical case studies, however, suggest that hidden political ambitions have often shaped science diplomacy initiatives, and that science diplomacy exercises maintain or even exacerbate global asymmetries in power and wealth. This panel, sponsored by the DHST Commission on Science, Technology, and Diplomacy (STAND), explores the new trends in science diplomacy studies by carefully considering the politics of science diplomacy. It considers the tensions between collaboration and competition, the relationship between political parties and alliances to scientific activities, the sorts of historical actors key in science diplomacy, and the place of international and intergovernmental institutions in the evolution of science diplomacy. This panel has great relevance for answering the question of how polities and societies today can maintain constructive relations through science while tackling problems and crises that threaten whole regions and populations. The four papers within suggest the degree to which analysis of the historical foundations of today's science diplomacy is involved in doing that.

The Other Needham and China: Situating Dorothy Needham in Sino-British Science Diplomacy, 1944-1972

- *Gordon Barrett*

Typically, any discussion of 20th century Sino-British relations refers to biochemist turned historian of science Joseph Needham's efforts as head of the Sino-British Science Cooperation Office during the

Second World War and efforts as a 'foreign friend' of the People's Republic of China during the Cold War. Yet, in both cases Joseph Needham's activities were far from solo efforts; rather, he acted in collaboration with a network of other activist scientists. Dr Dorothy Needham, was heavily involved in these activities, was as committed an activist and internationalist as her husband and the two shared a wide range of passions which went well beyond their biochemistry research.

As a research scientist, Dorothy Needham was best known as an authority on the biochemistry of muscular contraction, but in 1944, she travelled to China's wartime capital of Chongqing to serve as Associate Director of the Science Cooperation Office. After the Chinese Communist Party came to power, she undertook extended trips to the People's Republic with Joseph Needham and Lu Gwei-Djen, first in 1964, and again in 1972, with the latter in particular taking place in the midst of a rapid expansion in Sino-Western scientific exchange activities. While Dorothy Needham travelled to China with her husband, her experiences and activities in China were notably distinct in many key respects. This paper examines her activities, interactions, and networks in China which provide an alternative view – and narrative – to those normally associated with Joseph Needham and, in doing so, analysing the gendered dimensions of science diplomacy.

Turning the World Upside Down. The naturalist Correia da Serra and the American Hemisphere Project

- Ana Simões & Maria Paula Diogo

José Francisco Correia da Serra, known as the Abbé Correia da Serra (1751–1823), was a leading figure of Portuguese Enlightenment, a botanist and a catalyst in the communication between different scientific communities. In 1812 he was appointed ambassador of Portugal in the United States. He trained the emerging community of young American naturalists and advised high-rank political figures among whom stood his freemason brother Thomas Jefferson. When discussing topics of political economy over a cup of tea, he practiced informal science diplomacy. Additionally, he was behind the enactment of the Neutrality Act of 1817, advocating the non-interventionism of the United States of America in the realm of international relations, an instance in which he exercised science diplomacy *avant la lettre*. Finally, he explored what we may call science diplomacy imaginaries, when he designed, together with Jefferson, a project to build a new international order, splitting the American continent between the United States, in the northern hemisphere, and the "Brazilian Portugal," in the southern hemisphere. This utopian vision grounded on their shared views on politics and history, was guided by the structural and integrative function of science. The American Hemisphere project was behind the vision of a new geopolitical continental block, fighting for hegemony vis-à-vis the old European continent.

Through these three instances of science diplomacy – informal, formal, and imagined – Correia da Serra helped to mold a new geopolitical order, both real and imaginary. At the historiographical level, the science diplomacy lens brings a new light to the practice of Correia da Serra as both naturalist, diplomat, and visionary.

When 'Purity' meets Politics. High-energy Physics in the Early Cold War Period

- Barbara Hof

This paper examines the politicization of international exchanges between physicists in the late 1950s and early 1960s, when several conferences on instrumentation in high-energy/particle physics took place. How did the exchanges between physicists from the USSR, the USA, and Europe occur in the wake of the first series of the so-called Rochester Conferences (1950-1957), what information was exchanged from 1957 to 1962, and most importantly, how did the East-West exchange shape the epistemic concept and social role of high-energy physics? Drawing on archival material from NARA at College Park; NARA at San

Francisco; the Distinctive Collection at MIT; and CERN archives, the paper explores the relationship between science and science diplomacy from the perspective of historical epistemology, arguing that international exchanges were facilitated by the fact that high-energy physicists demarcated their activities from Cold War politics by calling their field 'purely scientific,' even though their activities were not without political aspirations. That saying, the demarcation from Cold War politics was also relevant because governments and authorities would probably not have allowed exchanges between East and West without a commitment to 'purity.'

Diplomatic Studies of Science

- *Maria Rentetzi*

This paper argues that there has been a single most significant event for science diplomacy that occurred with the development of the United Nations system of specialized agencies and organizations. It was the moment that science was from the outset perceived as part of a complex collective arrangement, a comprehensive global agreement for the promotion of social and economic conditions that could ensure peace and prosperity right after the devastation of World War II. The entanglement of the political to the epistemic that proved inextricable after the end of the war, led to the understanding of science as constitutive of diplomacy. Science was no longer perceived as an instrument in the hands of state ambassadors but as a constitutive element of the UN's identity. The power of this part of postwar history is that it exposes the complexities of a tangled relationship between two intrinsically valued practices-the scientific and the diplomatic—in which the accomplishment of scientific work continually involves the articulation of what diplomatic multinational and multilateral negotiations consist of, while, at the same time, the art of diplomacy gets concretely embedded in the epistemic aspect of this work. It is the contention of this paper that the study of science and the study of diplomacy should and indeed can benefit from each other. In particular I argue that the co-productionist view which is prevalent within Science and Technology Studies (STS) provides a useful starting point and introduces the Diplomatic Studies of Science (DSS) as a promising field. My intention is not to make a programmatic appeal. I bring forward empirical examples from my work on the history of the IAEA and UNESCO to illustrate the potential of DSS.

43 - Boundings and Unboundings in the Sciences: Gender, Experimentation, and Authority – 1: Gender and sociomaterial science cultures

Room: **H.2.215**

Session organisers: María Jesús Santesmases & Andrea Núñez Casal

Chair: Maria Rentetzi

Session Abstract:

Over the past three centuries, experimental scientific research cultures have been performed in a variety of settings, methods, and means, inventing and modifying technical devices, experiments, and knowledge production. In modern western science, women participated in working spaces, its temporalities, and modes of work in laboratories as well as in other informal and experimental settings of scientific practice. In this context, few women developed an authority of their own while many were regarded as helpers, assistants, or technicians, mostly of men.

STS and historical studies on women and gender belongs to a ubiquitous politics of science that

established and consolidated some knowledges and practices as scientific and others as routines; some spaces as domestic and informal (i.e., homes), others as professional and formal (i.e., the university, the industry). The orderings of experimental work and its dissemination established gendered hierarchies of laboratory work at the intersections between spaces of scientific authority in the academia and the industry and the private spaces of the home.

This panel explores how boundaries, how the scientific ¨orderings¨ of labours, settings, and genders were produced and reproduced over the past centuries in experimental scientific research. This set of contributions shows the interplays between articulations of scientific truths and the experiential politics of knowing, between the official authority of science and the exclusionary practices of ordering genders, spaces, and temporalities. We analyse, within and beyond western science, historiographies of inclusive forms of scientific collaborations and interdisciplinary work, their situated knowledge-practices, gendered cultures, and materials that resisted the status quo of scientific authority.

The Science of the Letter: Microbiome Science, Proto-Immunology and Dispatches from Other Worlds

- *Andrea Núñez Casal*

The Science of the Letter takes as point of departure a 2013 handwritten letter. Authored by Father Luigi – an old Italian Catholic missionary in the Achuar settlement of Checherta (Peru) –, the letter was part of a series of correspondences with a reputed US female microbiome scientist. The focus of the scientist's pioneering microbiome research, was searching for 'ancient microbes' in the Peruvian and Brazilian Amazon as tentative biomedical solutions for restoring the microbiome of Western and westernised populations

Almost three-hundred years before, British writer and socialite Lady Montagu narrated in her *Turkish Embassy Letters* (1717-1721) how local communities tackled smallpox. Her dispatches from the Ottoman Empire unveils how race and class are inseparable from the figuration of the immune system as a biological mechanism of recognition and elimination of difference.

The paper examines the past and present importance of a seemingly obsolete, fragile, rudimentary, and gendered form of communication – the handwritten letter – not only in the emergence of proto-immunity but, crucially, in todays' microbiome science. Using analytical frameworks from the history of science and gender studies, empirical ethnographic data and archival research, the paper demonstrates how immunity and microbiome science re-emerge in the form of ecological nostalgia for a traditional and even 'ancestral' past. Through the material lens and journeys of a unique handwritten letter, I sustain that such revival of (gendered) unwaged care labour in microbial science and popular science accounts elicits the consequential role of women in science and non-western local health culture, values, and belief systems.

Gendered Diplomacy of the Spaces of Material Practices of Science: Inclusion, Collaboration, Marginalization in France between two Revolutions (1789-1848)

- *Isabelle Lémonon-Waxin*

After the Revolution of 1789 which established the first republic, France saw several political regimes (*Consulat*, *Empire*, monarchy) until the re-establishment of a new republic in 1848. This period was marked by a setback for women's rights and by the professionalization of science in specialized schools closed to women. This paper aims to show how the material practices of science obey a gendered diplomacy of spaces (Mille, 2021). As Martine Mille points out "diplomacy implies visits and representations, the mastery of uses and a common cultural experience, gathered around a personality with a significant aura" (a scientist, a couple, etc.) who maps the uses of space according to their own standards. This diplomacy sometimes contributes to including women in scholarly work or to offer them

spaces of collaboration. Meanwhile, it also confines them to the margins of institutions. Using several women's experiences in astronomy, botany, mathematics, or obstetrics, I will present the boundaries imposed on them by their gender and discuss the legitimacy granted to the knowledge they produce. Often relegated to the status of amateur knowledge, they sometimes find their place at the heart of institutionalized authoritative knowledge.

Sealing-Wax and String: How Everyday Things Carried Gender into the Physical Laboratory

- Donald L. Opitz

In this paper I explore the gendering of 'sociomaterial' culture of experimental practice in the physical sciences at the turn of the twentieth century. My focus is on the practices performed in experimental settings where physicists utilized commonplace, domestic tools like sealing-wax (and string), precisely during a period in which laboratories and their technologies grew in scale and sophistication. Notoriously a male bastion, the physical laboratory beckons for detailed, gendered analyses, which are increasingly important as we look to close the global 'gender gap' in STEM. The historiography on gender and science has emphasized demographic patterns, issues of policy and climate, work-life factors, and so on, but few scholars have attended to how laboratory materials—their physical, social, epistemological, and symbolic aspects—possess gender. The gender status of laboratory 'things', particularly in physical laboratories, are arguably inextricable from the gendering of the cultures of the natural sciences more generally. My paper builds upon relevant STS and gender studies perspectives to address this gap in the historiography. The status of materials like sealing-wax and string in everyday culture was also deeply gendered, and their transit across laboratory thresholds provides an opportunity for observing how the gender of things at times remains durable and at other times shifts. I suggest through this case study that the sociomaterial life of sealing-wax (and string) in physical laboratories at the turn of the twentieth century offers critical clues for understanding the wide gender gap that has historically persisted in the physical sciences and engineering.

The History of Gender Mainstreaming Policies at German and Austrian Academies of Science in comparison: Preliminary Results and further Discussion Points

- Sandra Klos

The Austrian Academy of Sciences began in the mid-1990s to implement their first gender mainstreaming policies, namely, in the department of prizes and fellowships. Following state-enforced reforms at the universities in the early 2000s the Academy also came under increased scrutiny and pressure to reform their rules and regulations. While the scholarly society remains mostly autonomous, the Academy as an employer for scientific and administrative staff was rapidly catching up to university standards.

Academies of Science are highly heterogenous institutions. Some are fully functioning research institutions (e.g. Vienna), others represent a more or less lose network of scholars (e.g. Halle). The states in which they operate are of course highly diverse as well and so are the public discourses on gender mainstreaming policies. Comparisons therefore face many challenges. At least for the German and Austrian academies of sciences, I would like to try my hand at a preliminary comparative analysis, focusing on gender mainstreaming policies as a point of departure.

Of course, gender mainstreaming is only a part of the more complex diversity management policies nowadays but it is usually the concept with which most academic institutions started historically. What were some best practice examples? Which departments changed their policies first and which the most thoroughly? Where were reformers facing the most resistance and why?

48 - History and Histories of Solvay Institutes: The Centennial of the First Chemistry Council and Beyond

Room: **H.1.301**

Organisers: Alessio Rocci & Yoanna Alexiou

Chair: Brigitte Van Tiggelen

Session Abstract:

Science policy involves local and individual strategies that promote selected scientific initiatives or technical research plans. One such example was Ernest Solvay, who believed that well-governed Science would and could only serve Progress. Among many acts of scientific philanthropy, Solvay was eager to help advance scientific knowledge through the founding of the famous Conferences and the International Institutes that bear his name. The impact of the Solvay conferences on Physics, initiated in 1911, is well known, in contrast with the chemistry conferences where much still needs to be investigated. 2022 marks the centennial of the first Chemistry Council (held in Brussels on 21-27 April 1922), which gathered physicists and chemists to debate questions at the boundaries of the two disciplines like e.g. isotopes, valency, electronic theory of matter and X-rays diffraction. Indeed, one of the aims of this first Conference was to improve the cross-fertilization between the two disciplines. Since then a diversity of topics has been addressed such as mineral and organic processes (from oxidation to combustion), molecules of life (vitamins, proteins, hormones, nucleoproteins, …), thermodynamics or surface science. In the meantime, the structure and the format of the conferences have kept to the tradition that started at the beginning of the century. This session will be the opportunity to explore the history of Solvay Chemistry Conferences and to investigate the history of Chemistry through the lens of the Conferences themselves. The Symposium will be focused on both the organizational aspects that led the Chemistry Conferences to occupy a specific niche in the wider landscape of scientific communication and conferencing and the scientific debates on the topics that were selected. We aim also to understand the impact on the disciplines, on research agendas, on the evolution of a specific concept or a research area.

Debates on the Intersection between Chemistry and Physics at Solvay Councils

- *Alessio Rocci*

In 1921 Jean Perrin suggested to Sir William Pope to add Sir William Henry Bragg to the list of participants of the first Solvay Chemistry Council. The invitation was motivated by the intention to promote a process of cross-fertilization between Physics and Chemistry. During the conference, held in Brussels during the spring of 1922, two distinct reactions emerged: some participants saw an opportunity to enlarge the realm of chemists, while others cast some doubts on Bragg's interpretation. The debate continued also in the following conferences, i.e., in 1925 and 1928, and it is intimately related to the understanding of the microscopic world. The purpose of our paper is to investigate it through the lens of the discussions contained in the proceedings and to analyse how the controversy evolved in connection with the transition from the old quantum theory and the Quantum Mechanics era.

A Hundred Years of Solvay Councils on Chemistry (1922-2022): A Unique and Adaptive Model of Conference

- Yoanna Alexiou

Brussels, 1913. The International Association of Chemical Societies gathers delegations from fourteen countries. This meeting financially supported by Ernest Solvay establishes the Solvay Institute of Chemistry and was presented as the First Solvay Council on Chemistry. The current series modelled on a pattern proposed by Hendriks Lorentz for the Solvay Council on Physics is but launched in 1922, and chemists adopted it despite some scepticism the model would suit international gatherings in chemistry. Twelves such Councils were held until 1963, when the Solvay Institute for Chemistry and the Solvay Institute for Physics merged in one institution: the Solvay Institutes. Since then, thirteen more conferences in chemistry were organized.

First, we will delve into the organizational model of the Solvay Conference. Our interest focuses on the way those chemists settled for a specific format of scientific conferences in an international scene already full of national and international meetings since the end of the 19th century (Faraday Society, International Union of Pure and Applied Chemistry).

Second, we want to explore how the Solvay Scientific Committee managed to guarantee the continuation of these prestigious conferences undisturbed by international political conflicts, on the one hand, and, on the other hand, to adapt to the evolution of international science during their hundred years of existence. Indeed, since the '50s, the international scene saw the spreading of many other conferences in chemistry on either side of the Iron Curtain as, for example, Gordon Research Conferences or Nobel Conferences compelling Solvay Institutes to constantly renew themselves while respecting their traditional original model.

Scientific and Social Developments in Chemistry as Mirrored by the Solvay Chemistry Councils, 1922-1937

- Ernst Homburg

There are few books on the history of modern physics that do not mention the Solvay Physics Conferences (1911-1927). The Solvay Chemistry Conferences received far less attention. Mary Jo Nye and Brigitte Van Tiggelen have written about the first three conferences, mainly from the viewpoint of the relations between chemistry and physics.

In my paper to be presented at the ESHS conference, I intend to address three major issues:

-1- how to the debates during the first six Solvay Chemistry Conferences, 1922-1937, mirror the development of chemistry in that period? Did the conferences portray a selective view on what chemistry is, or should be?

-2- was there a relation between the topics discussed at the Solvay Chemistry Conferences, and the type of chemistry that was relevant for the business of the Solvay company? This topic has not been addressed so far.

-3- what was the background of the chemists attending the conferences? There are some striking differences with the Physics Conferences. In the case of the Chemistry Conference the research-leader of Solvay, was present at all conferences, and also chemists from the ULB at Brussels (Wuyts, Timmermans, De Brouckère and Bigwood) were often present. It would be interesting to investigate whether the Solvay family and company tried to stimulate chemistry at its 'home university' ULB.

Discussion

49 - Communicating Astral Knowledge through Tables, Diagrams, Instruments, and Images (ca. 10th – 16th Century)

Room: **AY.2.108**

Organisers: Stefan Zieme & Anna Jerratsch

Chair: Matthieu Husson

Session Abstract:

In this symposium we present four case studies from pre-Copernican astronomy, from the medieval to early modern period, that aim to demonstrate the multifaceted ways and goals of communicating astral knowledge for specific audiences and via different means. Our focus is on the interplay of textual transmission specifically in relation to knowledge encoded in four more abstract formats and categories: tables, diagrams, instruments, and images. Even for rather canonical or allegedly stable bodies of knowledge, tables, diagrams, instruments, and images rather witness a dynamic and innovative nature of knowledge transmission. We argue they were not merely representative or illustrative adjuncts to texts, but active visual or material tools to express, to model, to develop, and to scrutinize astronomical knowledge, sometimes independently of or even in contrast to the texts they accompany. Through investigating these tools and especially their epistemic and communicative functions we will provide a distinct perspective and insight into the practices of astronomical knowledge and its comprehension across different cultures and time frames. With our specific focus on tables, diagrams, instruments, and images we offer a valuable complement to the traditional and more prominent methodological approach of textual analysis in the history of astronomy. This integrative approach, we argue, enables a novel perspective on the dissemination of astronomical knowledge practices across space, time, and cultures.

An Astronomical Toolbox for a Theologian: John of Lignères's Work for Robert de Bardis

- *Eleonora Andriani*

Between 1320 and 1325, the Parisian astronomer John of Lignères dedicates three works to Robert de Bardis, a Florentine theologian, known as a friend of Petrarch's and a respected scholar of Augustine of Hippo. In the general preface to these works, John of Lignères clarifies that his offering to Robert de Bardis consists of a set of tables and texts explaining the use of the tables, known as the *Tabule Magne*, followed by two texts on instruments. These instrument texts are the *Equatorium* (i.e. an astronomical instrument used for finding the positions of the Moon, Sun, and planets without the use of tables beyond mean motion) and the *Saphea* (i.e. a universal astrolabe, that is to say usable in any latitude). With this collection, John of Lignères aims at providing his dedicatee an autonomous and simple set of tools related to spherical and planetary astronomy. In this paper, I will argue that John of Lignères successfully achieves his goal. The composite character of this tripartite astronomical toolbox, including a whole set of astronomical tables and canons and two instrument texts, highlights John's intention to provide complementary approaches towards astronomical topics. These approaches may have sometimes been considered redundant by those historical actors who copied, used and occasionally altered these works, regardless of the authorial intent. In my presentation, this work by John of Lignères will serve as a case study to discuss the transmission of astronomical knowledge through texts, instruments and instrument texts.

On the Transmission and Translations of the Almagest: A Network Analysis

- Stefan Zieme

Ptolemy's *Almagest* is among the most important sources of mathematical astronomy from antiquity to the early modern period. Originally written in Greek and referred to as *Syntaxis mathematica*, nowadays it is better known by its mediaeval Arabic name *Almagest*. It was translated several times before the sixteenth century. Today, beyond Greek and Byzantine sources, six different translations are still extant in their entirety that comprise translations from Greek into Arabic, Arabic into Latin, Greek into Latin, and Arabic into Hebrew. In total there about 120 manuscripts still extant through which knowledge on the *Almagest* has been transmitted in different cultures, languages, and times. In this talk I will present an initial network analysis of the entire corpus of manuscripts of the *Almagest*. The data on which statistical analysis will be performed is the astro-mathematical content of the *Almagest*, i.e. its tables and diagrams. Thus, from tables and diagrams, I define a modular set of markers that correspond to conjunctive errors in traditional philological approaches. These markers are the basis for a network analysis. After gauging my algorithm with respect to established philological results, I will present some novel insights about the cross-cultural transmission of the *Almagest*. In particular, my analysis can unearth specific manuscripts of hybrid character with respect to different knowledge traditions. These may prove highly promising for further transdisciplinary analysis of cross-cultural knowledge exchange and may highlight transformations in communicating astral knowledge.

Diagrams for Visualizing Structure and Motion in Islamicate Astronomy: The Case of the Moon

- Scott Trigg

Theoretical astronomy (*ʿilm al-hayʾa*) in the premodern Islamicate world was both a continuation of, and a break with, Hellenistic astronomy. In particular, rather than two-dimensional circles it was now physical, three-dimensional spheres that were seen as the appropriate "building blocks" for astronomical models. Previous research has highlighted Islamicate astronomers' critiques of Ptolemaic models and their innovative solutions, but little attention has been paid to the function of diagrams as more than an adjunct to the text. This paper takes manuscript diagrams for the lunar theory as a case study, arguing that diagrams fulfilled a vital function as tools of reasoning. Diagrams not only helped to illustrate celestial phenomena associated with the motion of the Moon, but served as a crucial means by which astronomers could visualize problems associated with the three-dimensional structure of complex astronomical models, propose new solutions, and analyze and critique the work of their predecessors. The lunar theory is the first application of the famous Ṭūsī-Couple device in Naṣīr al-Dīn al-Ṭūsī's (d. 1274) *Tadhkira*, providing an entry point into a series of discussions of non-Ptolemaic astronomical models by Ṭūsī's contemporaries as well as commentators on his *Tadhkira.* By exploring the topics for which an author chose to provide diagrams, or for which commentators added diagrams not present in the base text, this paper demonstrates how manuscript diagrams served to develop and communicate knowledge about physical bodies in motion, and also highlights significant features of the visual practice of Islamicate astronomy.

Visualizing Cometary Knowledge: Three Cases from 1556

- Anna Jerratsch

In early modernity, a new methodological approach to comets became relevant due to developments in theoretical and practical astronomy, the integration of an Islamicate form of judicial astrology into the realm of cometary prediction, the enthusiasm for prodigious natural phenomena in a time of political and religious uncertainty, as well as new means of representing and distributing information enabled by the

still new technology of letter press printing.
The period between the Reformation and the Enlightenment was marked by an increased scientific and cultural relevance of comets. Especially in the early-modern German speaking world, this debate about nature evolved within a novel form of communications culture witnessed by the publication of a bevy of small vernacular pamphlets and broadsides. Images played a key role in this multifaceted media discourse as means of visualizing knowledge and observational data, as agents of conveying theoretical and interpretive ideas, and, not least, as selling arguments on a contested print market.
This paper comparatively analyzes three visualizations of cometary tracts published by Paulus Fabricius, Johannes Hebenstreit and Joachim Heller on occasion of the comet of 1556. The practices of illustration, the contexts and sources, as well as the purposes and reception of these three examples are comparatively discussed. Specifically, I want to argue that these representations can be considered as the first attempts to visualize the apparent course of a comet on the celestial sphere in a diagrammatical format. These visualizations were shaped by the contemporary material culture of astronomy and served different communicative goals.

57 - Making Legitimate Science in Tumultuous Times: Semantics, Communication, and the Public in Late-Enlightenment France (1773-1811)

Room: **AW.1.126**

Organiser: Valentine Delrue

Chair: Stéphane Van Damme

Session Abstract:
France right before, during, and after the French Revolution was the theatre of several discussions about legitimacy and legitimation of “scientific” knowledge, due to several factors that historians have been largely investigating.
The question of *what* was legitimate scientific knowledge was the subject of vibrant and constant negotiations between very diverse actors, networks, and audiences. In particular, specific challenges were raised for individuals working in domains of knowledge that were not yet deemed authoritative and generally accepted, or were even considered marginal. How can one make the “incredible” credible in these tumultuous times where the protagonists, institutions, and publics of science-making and authorizing constantly changed? This symposium will discuss, once again, how strategies of legitimization and authorization were incessantly tested, contested, and re-shaped, depending on the contexts and on the audiences one aimed to reach. Namely, the three case studies presented will shine a light on the dimensions of semantics, language and public communication which will allow to reconstruct the different meanings in these debates.
The mesmerism controversies of the early 1780s demonstrate the relevance of studying *semantic* contests and exchanges in order to reconstruct the multiple meanings of (legitimate) scientific practices. The importance of language, communication and public perception is also evident in the debates solicited by Lalande’s mémoire on the probability of an impact between comets and the Earth, which further prove that the interactions between science in the making and its audiences were a two-way relationship. The project about atmospheric tides meteorology shows the important part that the public could and had to play, moving between the role of a judge and a participant in the making of weather knowledge.

Together, these three cases will demonstrate the fundamental roles played by different contexts, meanings, institutions and audiences in the perception and construction of knowledge with "scientific legitimacy".

What a Comet can Make to You

- Ilaria Ampollini

In 1773, the French astronomer J. Lalande (1732-1807) was supposed to present his *Mémoire sur les comètes* at the public meeting of the Parisian Académie des Sciences. A part of the paper dealt with the probabilities of an encounter between comets and the Earth: Lalande stated that, on the basis of available knowledge, it was mathematically and physically possible that one day a comet would impact our Planet or sensibly approach it, thus provoking a dangerous tidal rise. When his speech was canceled, due to lack of time, people suspected Lalande had been censored by the Académie before he could announce an imminent catastrophe. Fear and terror spread out. Among the several historical issues the episode brings to our attention, the question of credibility and legitimacy of astronomical knowledge is certainly there. The occasion cost a lot to Lalande in terms of credibility: some of his colleagues did not hesitate to dismiss his statements as foolishness; some others ascribed the entire story to Lalande's desire to be in the spotlight; whilst others questioned the correctness of his calculus. The learned circuits doubted Lalande's reliability and the Académie des Sciences, despite officially defending its member, held an ambiguous behaviour. Among laymen, Lalande's provisional and probabilistic esteem, which built on Newtonian celestial mechanics, was perceived as though it were a prophecy and Lalande treated as though he were an astrologue. What happened shows how "popular" panic, generated by quite groundless suspects and misunderstandings, could undermine the authority of one of the most known members of the Parisian Académie. It is not by chance that the scientific content at the core of the episode was an emerging one, namely the theory of cometary return and the possibility of mathematically calculating their future passages.

Making 'Deposits'. The Mesmeric *Dépôt* and (Il)legitimacy (1779-1784)

- Chloé Conickx

Few controversies capture the high stakes of the battle for medical legitimacy like the Parisian mesmerism affair of the early 1780s. Mesmer had invented a new medical therapy, based on the discovery of a magnetic fluid he could wield to heal diseases. This gave rise to an intense debate regarding the credibility and authority of Mesmer's doctrine, which historians have explained in two main ways: on the one hand, as shaped by complex social dynamics, and on the other hand as the objective of reconstructed historical narratives.

Strikingly, Mesmer explicitly identified the ambiguities of *language*: communication was necessary to acquire credibility, but it could also generate illegitimate corruptions of his doctrine. This paper hence adopts a different approach to the matter, by arguing that the legitimacy of magnetic practices and practitioners was a function of one's ability to control *semantics*. More specifically, I show how the semantics of the master concept "dépôt" constituted a quintessential battlefield of the mesmeric controversies of the early 1780s, and how control over this concept determined the legitimacy of spokespersons and practices. Firstly, I argue that Mesmer developed "dépôt" to demarcate the actual contents of his doctrine and to specify the conditions that authorised one to speak on behalf of it. Secondly, I show that the concept was contested and re-defined by self-declared experts, to legitimise their spokesmanship and re-conceptualized practices. The paper thus demonstrates the relevance of studying semantic contests to reconstruct the complexities of the debate and the multiple meanings of legitimate practices.

Useful or Useless? The French Public as an Actor in Constructing Credibility for Atmospheric Tides Meteorology (1799-1811)

- *Valentine Delrue*

Starting in 1775, the French naturalist Jean-Baptiste de Lamarck (1744-1829) tried to understand the weather by studying the influences that the varying positions of the moon and the sun had on the atmosphere. Using Newtonian celestial mechanics, he hoped to make meteorology into a scientific discipline that could be useful for society as a whole and agriculture, medicine, and navigation on the sea in particular.

From 1799-1810, he published eleven *Annuaires météorologiques.* These yearly publications for the general public contained a weather calendar of the previous year, weather probabilities for the next year, and additional small treatises on different aspects of meteorology. The inclusion of these probabilities quickly led Lamarck's work to be criticized and compared to astrological almanacs. He constantly had to advocate for the legitimacy of his work and therefore adopted a wide range of changing strategies throughout his *Annuaires.*

Looking for a way to add credibility to his project, Lamarck insisted that the public could play a significant role in the advancement of meteorology not only as beneficiaries but also as witnesses and as cooperators. This public is never singular; he calls upon *savans,* laymen, members of agricultural societies, seamen, physicists, and meteorologists with different demands and expectations. This paper will show how he communicates his work and weather probabilities to them in very different ways, and flexibly repackages his *Annuaires* in his search for a willing audience who will participate in the making and authorizing of his weather knowledge.

Comment: Stéphane Van Damme

62 - From Akademgorodok to Science Park: The Political Economy of Research Spaces (1945-2000)

Room: **UB.2.147**

Organisers: Jorrit Smit & Timofey Rakov

Chair: Cyrus Mody

Session Abstract:

The world today is 'littered' with more and less successful attempts to create the high-tech utopia of the science park. Similarly, a Soviet 'science city' model – the Akademgorodok – spread through socialist regions in the Cold War. Such spaces are no neutral canvases for the pursuit of detached objective science. Rather, the design, use and circulation of these spatial models for clustered scientific research reveal visions of science and society, in relation to nature, culture, and political economy.

The spatial organization of scientific research in the second half of the 20th century is an exemplary site for the analysis of the science policy phenomenon, and the political economy of science more generally. By taking a transnational comparative perspective, this panel brings together real and envisioned spaces and places for scientific research from both sides of the Iron Curtain. Whereas most history of late modern science focuses on *either* socialist or capitalist science policies, the comparative approach should bring them into dialogue. Shared beyond this geopolitical divide, are ideas about clustering, proximity and isolation: that integrating and uniting different disciplines, research teams and societal actors can be

achieved through the spatial organization of science.
By exploring the nexus of spatiality, urbanism and political economy in historical examples from the period 1945-2000 in Eastern and Western Europe, and their circulation beyond, this panel will make the peculiarities, intricacies, and commonalities of these different integrating principles of diverse spatial models for science policy more explicit.

The Land of Tomorrow: Exporting Scientific Siberia to the United States (1975)
- *Ksenia Tatarchenko*
"Life, Science, and Nature" were the tree key words of the Soviet exhibition "Siberia Scientific," touring the United states for about six months in 1975-1976. The show was conceived and perceived as a Soviet one: a disclaimer placed at both entrances to the Smithsonian stated that the exhibition was the work of the Soviet Academy of Science and its Siberian Branch and expressed the pleasure of the institution and the state department to be hosting this *Soviet view* of Siberia. A display of the Soviet perspective on Siberian life, science and nature quite literally framed by the Cold War, "Siberia Scientific" thus presents a rich historical case for exploring the politics of science framing both the competition and the efforts at collaboration between the two superpowers. Building on the scholarship devoted to American exhibits, I study the exhibit as a visual and discursive assemblage providing an analytical magnifying glass that reveals how Siberia was defined as a territory in relation to science. I argue that the problematic relation to reality, the "hyperreality" of the display, should not be downplayed as propaganda but analyzed as showcasing, that is, a media for realignment of technological, environmental, and knowledge orders associated with Siberia. The exhibit offered a vision of the rational development of the productive forces in Siberia as the guarantor of the future socialist plenty, a vision illustrating a lager set of preoccupations connecting science policy to political economy that were circulating in the late Soviet Union.

Big Science in an Age of Valorisation: From Distance to Proximity through a Virtual Campus (1990 – 2020)
- *Hein Brookhuis*
With major investments into nuclear science in the United States and Western-Europe, the post-war development of research centres for nuclear applications represents what historians have understood as the advent of Big Science. In practice, this led to the establishment of research centres located far away from existing research laboratories and universities, spatially emphasizing the unique place these institutes occupied in national science policies. In this talk, I will explore the transition of Big Science from the 1990s onwards, proposing it as a case study to understand how this cold-war phenomenon developed and adapted to a more neoliberal and market-oriented understanding of science in an post-cold war society. Based on a case study of the Belgian Nuclear Research Centre, I will show how new networks with universities and companies tried to overcome the spatial distance that was established in the 1950s. I will do so by looking into the ambitions of the research centre on the medical market. During the 1990s, Dutch and Belgian producers of medical isotopes called themselves "Medical Valley" and "Isotope Valley," appealing to the sense of entrepreneurship and high-tech solutions for society that Silicon Valley embodied as the new ideal of science. The newly founded Medical Campus in Belgium, a virtual network with academic hospitals and pharmaceutical companies so simulate proximity, allows us to explore how the Belgian research centre embraced a capitalist vision on the valorisation of science in the 21st century.

Science Parks in the Polder. The Political Economy of Spaces for Knowledge Transfer in the Netherlands (1970-1990)

- Jorrit Smit

Dutch spaces for knowledge exchange were explicitly modelled on American ideals in the 1980s: the polytechnic school in Twente would become the core of the 'Dutch Silicon Valley', the University of Groningen dreamed of 'some kind of Instrument Valley' and in Leiden 'something like Silicon Valley' had to develop. The rhetoric around the plans for transfer points, business and technology centres and science parks had to gather sufficient allies and support for these new spatial modalities of knowledge transfer. The (Anglo-)American models circulated from the provincial periphery to the economic centre at the coast, and between researchers, engineers, policymakers and regional business communities all over Europe.

The demand for, and design of, hybrid places of exchange between scientific and societal actors is a typical trope of late modern Western science. The historical analysis of these places that stimulate and legitimate 'useful' science – or what I have called *utility spots* – brings into view the political economy of different ways of organizing research. In this paper, I zoom in on the rise of the 'science park' phenomenon in the Dutch context and how it symbolized a change from the social-democrat 1970s to the neoliberal 1980s.

The pastoral ideal of the science park symbolized a seemingly apolitical future of technological innovation that, in a way, announced the end of history. For the case of the Leiden Bio Science Park, I will highlight how the clean and clinical aesthetic of the park connected to the 'polder' landscape of the Leeuwenhoek in which it arose.

Forests of the Academy: Connecting Nature and Urban in Soviet Science-Cities

- Mikhail Piskunov & Timofey Rakov

By the middle of the 1950s the Soviet Union as well as the rest of the world took place an ecological turn. Involved in Big Science projects (especially nuclear and space) scientists played one of the key parts in this process. Soviet Big Science was mostly concentrated in small towns around large industrial centers due to considerations of secrecy and to the simplification of ideological control. A distinctive feature, for example, of Soviet nuclear cities such as Obninsk, Dubna, or Ozersk was the abundance of forests and lakes around them. Since 1958 many members of the Big science moved after Mikhail Lavrentyev to Novosibirsk to work in Akademgorodok, which had to be a new level of development of Soviet science, and was visually distinguished by a combination of forest and urban landscapes. Even in the 1990s local journalists and authorities liked to call Akademgorodok "Silicon Tayga". In our paper we will focus on the role of architecture and urban planning of science-cities for the formation of an environmentally responsible attitude to nature among Soviet scientists and their vision of new socialist science.

67 - Computing Politics in Late 20th and Early 21st Century - 1

Room: **AW.1.120**

Organisers: Arianna Borrelli & Liesbeth De Mol

Chair: Liesbeth De Mol

Session Abstract:

This Symposium offers a historical contextualization of the increasingly pervading use of computing in practically all areas of human endeavour. These developments are both shaped by political factors and have political implications whose breadth and depth are only recently being appreciated. A good example is "artificial intelligence", which has been hailed as a solution to long-standing problems, or denounced as a potential tool of discrimination. In political debates the historical dimension is often oversimplified, if not fully absent, and with this Symposium we wish to showcase research results by scholars investigating the history of these topics - scholars who come both from history and from other disciplines.

The contributions look both at the background and agendas of the historical actors developing and using computational tools in different contexts and at the technical features of the tools themselves, which could in turn at least partially shape both aims and conceptual frameworks of their users. We believe this and similar research can contribute to political discussions and open up new avenues of reflection, and wish to bring it to the attention of the broader community of historians of science and technology, where it has so far not been very present.

The Symposium has three parts. The first one presents examples of how specific computing methods and tools could become the shared core prompting the emergence of new communities. The other two parts focus on the history and politics of what is today usually referred to as "artificial intelligence," a term now comprising not only logical-mathematical formalization of thought processes, but also - and indeed primarily - methods like machine learning. A commentary and general discussion conclude the Symposium, which is organized by the Interdivisional Commission on History and Philosophy of Computing (HaPoC hapoc.org) of the Division of the History of Science and Technology and the Division of Logic, Methodology and Philosophy of Science and Technology.

No Limits? The Entangled History of Global Dynamics ca. 1972

- Sebastian Randerath & Jacob Birken

With the development of the climate movement around the publication of the "Limits to Growth", a new understanding of the global emerged. In this understanding, the global was supposed to be simulated by the computer – more precisely by the computer of a small group at MIT around Jay Forrester – in the form of "Global Dynamics". These dynamics were not only taken up by the Club of Rome, the OECD and in the capitalist USA. They became the political basis of entanglements of different actors from USA, USSR, Austria and Germany.

Based on the heuristics of "global computer modeling", different and partly conflicting interests came together on planned economy, computer development, nuclear power and global politics. As shown by the work on the US and USSR at IIASA in Austria, the Global Dynamics policy of the right-wing conservative politician Eduard Pestel in Germany, the emergence of the climate movement around the capitalist interests of the OECD and the command economy at IEOIP in the USSR, the "Limits to Growth" can be understood as boundary object in a geographical sense. In our paper, therefore, we aim, first, to show the geographical entanglements of “Global Computer Modelling”. Second, we examine the different and partly conflicting understandings of globalism and globalization of the projects around "Limits to Growth" itself. Our entangled-historical approach aims to dissolve analytical East-West dichotomies in order to examine capitalist market economies and late command economies as globally intertwined approaches

of computed future-making.

Abstraction as Power: The making of Computer Science in the Age of High Modernism (1950-1970)

- David Nofre

In a controversial lecture given at Stanford University in January 2014, entitled "Let's Not Dumb Down the History of Computer Science", computer scientist Donald E. Knuth launched an attack on the socio-cultural approaches that prevail in much of the current historiography of computing. Knuth's lecture has generated considerable discussion among historians of computing. But one detail of Knuth's presentation has escaped historians' attention, namely, his use of an overhead projector instead of a computer with the customary presentation software. Knuth does not stand alone among computer scientists in expressing their ambivalence towards the computer. In this regard, Knuth's choice of presentation technology might be understood as performing on stage the profound distancing from the computer that characterized the rise of computer science. Taking Knuth's presentation as a starting point, , I will argue that this powerful move towards abstraction was foundational to computer science. It responded to the challenges posed by the rapid commercialization of computing research, and built upon explorations on the similarities between programming notations, natural languages, and the formal languages of logic. Abstraction empowered university-based researchers in a time when computing research was being commercialized.

How to Trust a Blockchain-based Cryptocurrency? Conceptual Challenges of the Politics of Trust in Blockchain Systems

- Katja Stoppenbrink & Eva Pöll

Far beyond the mere issue of data protection the question of whom to trust has become centrestage in the politics of computing. Traditionally understood as a virtue-based interpersonal relationship, trust and its counterpart trustworthiness are currently increasingly being ascribed to relations between humans and artificial agents, robots, and even disciplinary domains like computer sciences. The creation of trust in technologies has become a first-rate political endeavour. For a long time, financial investments in blockchain-based cryptocurrencies were de facto reserved to insiders. The issue of trust worked up until today as an impediment to less well-informed circles, keeping them from participating in this unprecedented growth of value. While in 2008 in the now famous paper “Bitcoin: A Peer-to-Peer Electronic Cash System” the mysterious originator(s) of the bitcoin claimed under the pseudonym Satoshi Nakamoto that they had “[…] proposed a system for electronic transactions without relying on trust” (https://bitcoin.org/bitcoin.pdf), we submit that traders of a blockchain-based cryptocurrency can either be denounced as a bunch of irresponsible risk-seeking gamblers or – paradoxical as this may sound – they can be described as a community of trust. The decentralized nature of a public permissionless blockchain system such as Bitcoin is a core element in the creation of trust. By means of an underlying consensus procedure, all participants agree on the current state of the blockchain based on the data available to them. Subsequent changes to data inscribed in the blockchain can be detected, anyone can check the correctness of the data records in the blockchain, ensuring that no manipulation has taken place. First described in the 1990s as advances in cryptology (such as time-stamping of digital documents and the creation of secure logs), blockchain systems can be regarded as self-regulatory technologies relying on public verifiability instead of state-based regulation. However, the phenomenon of trust underlying such an anonymous, decentralized system is different from our conventional understanding of trust in personal relationships as an affective attitude. We argue that we are dealing with a case of largely unnoticed conceptual change when it comes to trust in blockchain systems.

71 - Counter-Knowledge – 1. Forms and Practices

Room: **AW.1.125**

Organiser: Alexander von Schwerin

Chair: Alexander von Schwerin

Session Abstract:

Counter-knowledge–or critical knowledge–has long been at the heart of activism within academia and beyond. Alternative movements have produced critical and alternative forms of knowledge, most prominently in the so-called New social movements of the 1960s and following decades, e. g. the environmental and anti-nuclear (protest) movements. Also, different strands within the countercultural movement tried new forms of life together including their theoretical, practical and technical bases, e. g. housing, energy production, agriculture, child care.

This series of three symposia seeks to elaborate further on the process and forms of knowledge production at the intersection between academia and the New social movements. The term counter-knowledge suggests a close relationship between on the one hand established science and technology and, on the other hand, alternative viewpoints/accounts critical of the mainstream position. This relationship seemed to be a main feature in the history of counter-knowledge, though it has been challenged constantly by esoteric forms of knowledge including conspiracy theories, quack medicine, and fake science. The aim is to foster and discuss historical studies that explore and bring forth new insights into the historical conditions in which counter-knowledge flourished, the form that it took and its effects.

In symposium I, we focus on forms and practices of counter-knowledge.

In symposium II, we focus more counter-knowledge in context.

In symposium III, we explore the epistemic tension within the realm of counter-knowledge.

Poverty Research or Research Poverty: The Evolution of Knowledge Production by Poverty Actors through Three Cases (Belgium 1950-1980)

- Els Minne

Prior to the 1960s, academic research into poverty in the European welfare states was almost inexistent. The lack of academic interest on the topic caused poverty organisations to produce their own research whilst fiercely criticising the absence of academic knowledge. When, mid-1960s, the organisations' call for research started to resonate in academia, the knowledge production of poverty organisations offered a practical alternative to the theoretical sociological studies on poverty. This (counter-)knowledge production in postwar poverty organisations has not yet been researched. In my paper, I will focus on three case studies from Belgium that demonstrate three different paths to knowledge production and together sketch an evolution of alternative knowledge production within these social movements. First (1950s), priest and war hero Edouard Froidure denounced the lack of academic research into poverty with *Paria's 57*, a book filled with self-conducted research that stirred Belgian society. Second (1960s), Catholic parish priest Jacques Van der Biest made counter-knowledge production a structural part of his fight against poverty by founding two Brussels-based urban organisations that conducted research into the construction plans of the city government and offer 'inhabitant-friendly' alternatives when necessary. Third (1970s), the pluralistic organisation *ATD Quart Monde* established a popular university on poverty that supplemented academic research with the knowledge of experience experts in poverty and became an international authority. Through their annual reports, statutes, mission statements, published texts and conference preparations and proceedings, these cases show the wide ranging motives and techniques of knowledge production within the poverty movement.

Media Techniques and Knowledge Production of Anti-Psychiatric, Feminist, and Esoteric Groups in West-Germany, 1967-1991

- Susanne Doetz

Anti-psychiatric, feminist, and esoteric groups, which were part of the New social and alternative movements in West-Germany, produced critical knowledge about mental conditions and attributions. In doing so, these groups participated in the process of an eroding difference between normality and madness. They all shared a therapeutic aspiration that involved the individual search for meaning and, in part, the fight for a political change. Their demand for authentic self-empowerment, self-determined subjectivity and spiritual self-realization was as much a guiding principle as it was an identity building factor. My central question is, how the media articulations of these groups created reason. How did they lead to a shift or displacement of rationality and/or to a prioritization of subjectivity? My aim is to reconstruct the material conditions of this process.

In particular, I explore how ideas and information were organized and knowledge shaped in the different media products. Who produced, reproduced, and distributed the media products and how? This raises the question of the possible effects of the media - both on their producers and on their recipients. My sources are pamphlets, brochures and documents of the *Kommune 1* and the SPK (*Sozialistisches Patientenkollektiv*); the anti-psychiatric magazine *Irrenoffensive* and the feminist magazines *Courage* and *Clio;* spiritual-feminist books; files of feminist publishers and bookshops; tapes, videos and books of the Neo-Sannyas (Bhagwan movement); auto-biographies and single interviews with contemporary witnesses.

(En)countering the World System: System Dynamics as Counter-Knowledge and Hegemonic Toolkit

- Jacob Birken & Sebastian Randerath

In 1972, a short book full of computer-generated graphs turns into a rallying cry for the nascent environmental movement: *The Limits to Growth,* a 'report' submitted by MIT scientists for the *Club of Rome,* an NGO founded in 1968 by a group of business and administration elites. Given its urgent message about an inevitable "ultimate collapse" of the "world system" due to population growth and resource consumption, the book's popular reception can be understood as an academic project inspiring or underpinning eco-activism.

Methodologically, *Limits of Grows* emerges from a MIT department led by IT pioneer Jay Forrester, who had been promoting computer-aided analysis of complex systems since his 1961 book *Industrial Dynamics.* In Forrester's vision, such analysis would indeed provide counter-knowledge, disengaging from 'traditional' (human) interpretations of economics or social policy and providing radical insights into fields like supply chains, urban planning, and – finally – global economy and ecology.

In *Limits to Growth*, Forrester's concepts coincide with issues relevant to the ecological movement. Yet, its methodology and the patronage by the *Club of Rome* place it within a 'world system' that remains clearly capitalist and possibly authoritarian. In our presentation, we want to trace how Forrester's technocratic counter-knowledge translated into eco-activist counter-knowledge by discussing the disruptive epistemology of his 'system dynamics' and its use for both activism and establishment politics in the 1970ies, analyzing both the book's public impact and the academic and institutional "paper trails" it left behind – and offering a critical perspective on today's computed 'world models' as counter-knowledge.

13:00-14:00 – *Lunch & ERC Brownbag*

Outreach session on the ERC funding opportunities for historians of science

Room: **H.1.309**

The main aim of the ERC Brownbag session is to present the ERC funding schemes (Starting, Consolidator, Advanced and Synergy grants), the specificities of the SH6 "The study of the human past" panel and the potential of these grants for applicants at different career stage (from post-doctoral researchers to well-established historians) in the field of history of science. Two ERC grantees will then present their experiences in going through the selection procedure and running ERC projects in this field.

Introduction and presentation of the ERC grant opportunities for potential applicants in the field of history of science

- Dr. Flavia Cumoli (ERC Scientific Department, Brussels)

- Prof. Maria Rentetzi (FAU Erlangen-Nürnberg) PI ERC project HRP_IAEA "Living with Radiation: The Role of the International Atomic Energy Agency in the History of Radiation Protection" presents her research and experience

- Dr. Matthieu Husson (CNRS, Observatoire de Paris), PI ERC project "ALFA Shaping a European Scientific Scene: Alfonsine Astronomy" presents his research and experience

14:00-16:00 - *Sessions*

9 - The Scientization of Central Banks – 1. Sociology and Measurement of Scientization

Room: **AW.1.126**

Organisers: Aurélien Goutsmedt & Francesco Sergi

Chair: Matthias Thiemann

Session Abstract:
In the last decades, central banks have become crucial institutions in the management of many countries' economies. This evolution has been accompanied by a rising 'scientization' of central banks. Scientization could result from the wish to base policy decisions on "science" (mainly, economics); hence it could be understood as the logical consequence of the technical dimension of central banks' interventions (whether regarding their role in terms of monetary policy, or of micro- and macro-regulation and the supervision of the banking and financial system). Notwithstanding this logic, scientization then comes with the risk of making central banks increasingly "apoliticized," "basing their views on (…) the language of science" (Marcussen, 2009), out of reach of the citizens' (and politicians'?) understanding and control. Besides, it is not easy to distinguish the actual reliance of central banks' decision-making on science from the mere reference made to science for reputational and communicational motivations.

Whatever their motives, central banks have also become a major provider and funder of (economic) research; for instance, most macroeconomists publishing in academic journals are affiliated to central banks (Claveau and Dion 2018). This rising engagement of central banks with the production of economic knowledge raises the question of their influence on the content of such knowledge: how does this affect the paths taken by research, or limit the number of contributions criticizing central banks' policy?
We think that the concept of scientization is a valuable concept, as it helps raising relevant questions to study the interplay between central banks' practices and the ideas and tools developed by economists, as well as to think about the role that science can play in the choice, the implementation, and the justification of economic policies:
- How have hiring and promotion patterns changed over the years in central banks? How has this impacted central banks' research practices and/or the policymaking process?
- Which research policies were developed by central banks? How have these research policies reshaped research dynamics in economics (topics, theoretical frameworks, empirical methods)?
- How has economic knowledge been competing with other types of knowledge in central banks (law, finance, management, new quantitative approaches like machine learning, etc.)?
- How has research become a reputational and communicational issue for central banks?
- Did central banks become more reliant on science, when implementing their policies?

Professional Decoupling or Interrelated Intellectual Field? The Relationship Between Central Banks Knowledge Production and Academia

- *Edin Ibrocevic*

The sociology of economics has arrived at a strange impasse. While one line of argument puts the co-evolution of economics and society to the forefront, the other assumes the existence of a global mainstream dominated by US economists, who managed to become the effective arbiters of what is considered scientific economic knowledge. However, economics cannot be co-evolving with the national institutional arrangement, while simultaneously being exogenously imposed by a global (US) profession. In this article I shed empirical light on this intra-professional tension by analyzing central banks, which have themselves become stuck between the need for adherence to global professional demands, while at the same time have been embroiled in ever increasing administrative tasks of economic governance. Empirically I rely on a large bibliographic dataset of all working papers published by the G20 central banks, the IMF and the BIS (N ~ 40.000) in addition to the top 15 economics journals in general economics, macroeconomics and finance (N ~ 60.000) as a proxy for knowledge production in academia and by central banks. By utilizing the meta-data for author affiliation, citation patterns and alternative publication venues, the analysis provides empirical evidence for the degree of scientization of national central banks. Furthermore, the analysis utilizes social network analysis and cluster analysis to test two possible outcomes for the tension between the global profession and knowledge requirements for state-craft: a stronger interrelation between academia and central bankers or the emergence of a self-referential professional community of central bankers decoupled from academic activity.

The Banque de France as a power-knowledge configuration. A socio-historical case study of a scientized central bank?

- *Maxence Dutilleul*

The greatest part of the literature on Central Banks has treated them as monolithic economic institutions (Duchaussoy et Feiertag 2016; Feiertag 2007), policy-makers (Fontan 2017; Monnet 2015, 2018) and market actors. Recent contributions pointed out a broad historical process of scientization of central

banking (Claveau et Dion 2018; Marcussen 2006, 2009; Mudge et Vauchez 2016). Rare contributions to the study of central bankers highlighted the role of outstandingly talented figures – see for instance the issue « Greenspan, magicien ou illusionniste ? » (« Greenspan, the wazard or the illusionist? ») in L'Economie politique (2006/1, No 29) - or studied high-ranked decision-making personal (Lebaron 2010, 2013; Lebaron et Dogan 2016), often assuming that they form a homogeneous group both in terms of social features and believes (Kaelberer 2003). The aim of this study is instead to question the relevance of these two assumptions – scientization and epistemic community – with a historical sociological approach attentive to individuals and a comparative method careful about the diversity of central banking. I demonstrate that the rise of the research function follows from a longer historical process starting in post-war years in France but that its recent intensification results from a strategical watershed over the past two decades. I argue that research is part of a new policy strategy based on the idea of « market neutrality ». Hence, the study analyses jointly the formation of the field of power and the formation of a field of knowledge giving sociological explanations for the « neutralisation » effect of knowledge production. The study rests upon interviews with central bankers at the ECB, and the Banque de France, prosopographic analyses, qualitative and quantitative analyses of the economic literature published by CBs and archival work.

Scientific Trajectories of Central Bank Governors in the World: A Global Comparison 2000-2020

- *Aykiz Dogan & Frédéric Lebaron*

This paper proposes to analyse the scientization of central banks by focusing on the social trajectories of the central bank governors since 2000. This study on biographical characteristics of these decision-makers from a diachronic perspective provides insights on global and regional tendencies regarding an embodied scientific "culture" within the decision-making processes of central banks. Our previous studies suggested in fact an increase in the nominations of economists with highly qualified academic profiles to governor positions. Does that mean scientific profiles are replacing bureaucratic or private profiles in central bank governance? Are there regional differences regarding the opposition between different types of CB governor profiles?

We propose regional comparisons to observe varying degrees of scientization in central bank high-level governing bodies in the world between 2000 and 2020. This study is based on our prosopographical CENTBANK database which includes biographical properties of central bank governors of about 200 countries and territories regarding their educational and academic background, professional experiences, especially their research careers and publications, etc. We use Geometric Data Analysis in order to visualise and analyse these characteristics from a relational and comparative point of view. This quantitative work will be completed by various individual case studies on a small set of representative CB governors, their scientific careers, productions and references, as well as network connections in international organizations, think-tanks and scientific communities.

Overall, we will analyse scientization as a social historical process by which academic professionals and qualified scholars tend to become leaders of central banks at the expense of less academically qualified actors. We will discuss the appointment of qualified scientific practitioners as a way to enhance this "scientific culture" inside organisations.

Researching the Research: A Central Bank Edition

- *Simona Malovana, Martin Hodula & Zuzana Gric*

Economic and financial research plays a pivotal role in central banks around the world. The key characteristic of the scientization of central banks is a tightening of the relationship between central banking and economic science. We build two unique data sets describing research in central banks in

Europe and the United States. These data sets offer a novel insight into central banks' research activities, the research topics covered, collaborations between central banks and with other institutions, gender diversity and research popularization, among other things. We identify significant heterogeneity among central banks from different regions. Nevertheless, we identify several important stylized facts. First, following the Global Financial Crisis, financial stability surpassed monetary policy as the leading research topic. Second, we document a substantial decline in papers with single authors, from 40% in 2000 to less than 20% in 2019. Still, research in central banks is highly concentrated, as the top 10% of authors contribute to about 50% of all central banks' research publications. Third, while central banks form enormous research networks, we find that most of this research collaboration is region-specific. Fourth, we document an increasing representation of women in research teams, but the gender gap persists and is closing only slowly. In this respect, small central banks are found to employ more female researchers than large ones. Fifth, major central banks with a well-established research tradition achieve the highest average impact factor, with a few research papers contributing the most to this average. Overall, the observed scientization of central banks might be akin to a bandwagon effect: a few research-oriented central banks are identified as ``successes'', which incentives other central banks to copy the model and, as the model diffuses, it becomes the thing to do, rationalized by the claim that in-house research makes for better policy.

12 - The Office as a Place of Production, Adaptation and Circulation of Scientific and Academic Knowledge

Room: **AY.2.114**

Organiser: Thomas Brandt

Chair: Thomas Brandt

Session Abstract:

While the laboratory as a site of research has been amply studied by historians and sociologists, less attention has been given to the academic office as a place of production, adaptation and circulation of scientific and academic knowledge. Public discourse on the built environment for academic work is today to a large degree dominated by cost-efficiency thinking, and the idea of so-called open, activity-based office spaces has been met with resistance from academic staff. Temple (2008) asserts that the purpose of teaching and learning spaces, including how the offices are used, has to a large extent been absent from accounts on campus design.

And while there is abundant scholarship demonstrating the promises and pitfalls of activity-based open-plan workspaces (Kaufman-Buhler 2020), little is known about the importance, functions, and meaning of individual offices for academic work, and to which extent and how academics use the individual offices as a multipurpose and flexible workplace. Coming from the field of education and management, Ruth (2015) points to the importance of materiality in academic life, including the furnishing of stuff and things in the office, and how that material contexts help shape academics' identities.

In this symposium, we intend to investigate the office and other built environments for academic work as places of scientific knowledge production and circulation through history. We are interested in understanding these places and spaces both from the institutional history point of view, as a part of strategic planning and university policy, and from the point of view of the individual historical actor: Which role did the built environments play in the professor's professional life, and how did they contribute to shaping scientific and scholarly identities in different historic and geographic contexts? How have

academics used the individual office as a multipurpose and flexible workplace?

The Academic Office Through Photographs: Making identity and Knowledge at the Norwegian University of Science and Technology (NTNU) from the 1910s to the 2020s

- Annette Lykknes & Magne Brekke Rabben

While the laboratory as academic workplace has been a popular subject for historians and sociologists alike in the 1980s and 1990s (e.g., Latour and Wolgar, 1979; Latour, 1987), attention has increasingly turned to other places of knowledge-making like the museum or homes (e.g., Fyfe and Lightmann, 2007; Opitz et al., 2016; Gooday, 2008). However, the role of the *academic office* through history has received little attention by scholars. The project *The Academic Office as a Theatre of Memory and a Milieu of Ideas* seeks to investigate how academic offices at the Norwegian University of Science and Technology (NTNU) and its forerunners have been used and what purposes they have served. The office is a place that is both public and private, making it an interesting case for the study of professional academic identity and use. Archival sources on how offices were used by university staff are scarce. However, NTNU has ample photographic records of office usage. Inspired by scholars who write history from things (Lubar & Kingery, 1995) and who use images to tell stories texts are silent about (Burke, 2010), we will use photographs of academic staff's offices to shed light on the role the academic office has played through NTNU's history between 1910 and the present time. We will particularly look at how the images depict professional identities, what they tell about historical changes in material, scientific, technological, and cultural contexts and what the images inform about objects and their roles in the offices (Ruth, 2015; Burke, 2010).

Conceptualizing and Situating Knowledge Production: The Academic Office in History and Theory, and Locally at the Dragvoll University Campus in Trondheim

- Mattias Bäckström & Thomas Brandt

This paper will outline some research results from the project *The Academic Office as a Theatre of Memory and a Milieu of Ideas.* It will consist of three parts: **I.** As a starting point, it will reflect on the historical and theoretical dimensions of relevant concepts. By using conceptual history (Koselleck 2002), the paper will present findings about the change of meanings in the term 'office' (*kontor*) in the twentieth century. The paper will also address the spatial-analytical distinction between 'space' and 'place' (Ingold 2010), made in relation to the academic office and built environment by scholars in education and management (e.g. Ruth 2015; Kuntz 2012). **II.** Deconstructing the distinction between 'space' and 'place', the paper will use the project's findings when proposing and discussing the following tripartite conceptual framework: the academic office as a 'theatre of memory', inspired by the spatial-material notion and technique of artificial memory from the classical antiquity onwards (Yates 1966); as a 'milieu of ideas', i.e. the location in which actors receive, transform and produce ideas (Ambjörnsson 1983); and as a 'special space in a flexible structure', i.e. a structuralist notion on building socio-material patterns for non-formal situations and relations between teachers and students as well as between humans and things (Larsen et al. 1971). **III.** Using and problematising the tripartite conceptual framework, the paper will expand on some research results from the project's archival and architectural studies of the first construction phase of the Dragvoll University Campus in Trondheim, which was inaugurated in 1978.

Sites of Knowledge – Sites of Negotiation: The Role of Seminar Rooms in Institutionalizing Research and Education

- Daniel Normark & Lars Fälting

In the 20th century expansion of universities, research and education moved from institutional buildings (classically according to the logic one professor, one institution, one building) into larger offices where work could be co-located yet functionally separated and placed in different rooms. Both BMC (1968, no. 9) and Hum-C (1974, no. 2), as part of Uppsala university, where examples of these macro-buildings created to house the economics of scale in academia. Created and planned at the same period of time the two buildings housed different forms of research and education and were created according to different principles of optimization. BMC, with laboratory-heavy life science, focused on the flexibility and adaptation of the house for an unknown future, while Hum-C, centralizing the institutions within the humanities, was created according to generic optimizations of teaching.

This paper studies these sites of knowledge and how they facilitated knowledge negotiation (both as practices of research and as practices of education) by focusing on the design and use of seminar rooms. Despite the different types of research facilities and disciplines both buildings included ordinary functions such as offices and seminar rooms and these rooms were used both in research and education. Still the logic of these large-scale knowledge factories differed which resulted in different designs, spatial technologies and material assemblages. By looking at the planning process and the housing-committees notes (once the building was in use) a comparison regarding the different logics of flexibility or alignment can be made.

Discussion

23 - Science Policies and Scientific Collaboration - 2

Room: **AW.1.121**

Organiser: Luca Guzzardi

Chair: Chiara Lisciandra

Session Abstract :

When we look at formal indicators of scientific collaboration, such as the number of co-authors per paper, collaboration seems far less common in the social sciences and humanities than in the natural sciences. The average number of co-authors per paper in the social sciences, for instance, is 2.7, whereas in physics it exceeds 10, in humanities fields such as philosophy, it stops at 1.2 (Paul-Hus et al., 2017). However, in the last decade a new stream of quantitative and qualitative studies has shown that scholars in the SSH domains collaborate intensively as well, even if their collaboration is not always reflected by co-authorship practices. In this sense, SSH scholars face problems close to those of their colleagues in the natural sciences, such as coordinating the research action toward common goals, establish hierarchies, allocate rewards, negotiate a common lexicon.

The symposium “Science policies and scientific collaboration /2” focuses on collaboration practices in the social sciences and humanities. By exploring several, mostly interdisciplinary, case studies from various SSH domains, it aims 1) to offer insights of how collaboration occurs and shapes research practices in these domains; 2) to elicit a broader understanding of what counts as research collaboration in science.

References:

Paul-Hus, A., Mongeon, P., Sainte-Marie, M., & Larivière, V. (2017). The sum of it all: Revealing collaboration patterns by combining authorship and acknowledgements. Journal of Informetrics, 11(1), 80–87. https://doi.org/10.1016/j.joi.2016.11.005

Not More than Exchanging Tools: Early Encounters between Mathematical Economists and the Behavioral Sciences Movement, 1950-56

- *Catherine Herfeld*

This paper aims to better understand the interdisciplinary collaboration between economics and the behavioral sciences during the early Cold War era in the United States. I focus on the relationship between mathematical economists and the behavioral sciences movement during the early Cold War era in the United States. I offer a portrait of circumstances under which mathematical economists were willing to engage in collaboration with behavioral scientists, how this collaboration was tentatively hinted at, and how it ultimately materialized. I argue that the process in which economists interacted with behavioral scientists was characterized by protracted tensions in economics that originated partly in a difficulty of bringing interdisciplinary collaboration together with the goal of securing the discipline's scientific status. While economists did not outright reject interdisciplinary interaction, collaboration between them and the behavioral sciences – initially only proclaimed but later taking place – was ultimately realized only to the extent that scholars could trade tools.

Paths that did not Cross. The Failed Collaboration between Philosophy of Science and Science Policy in the Second Half of the Twentieth Century

- *Eugenio Petrovich*

Since its first occurrences in the early 1970s, the term "science policy" has been used to individuate two distinct, albeit interrelated, topics. On the one hand, "science for policy", i.e., the role of science in the design of public policies and policy making. On the other hand, "policy for science", i.e., the planning, organization, and resource allocation for the scientific activity. In this second sense, science policy as a practice and as an academic field has been influenced by statistics, economics, public management, bibliometrics, and, marginally, sociology of science. Other disciplines studying science, such as history of science and philosophy of science, however, have remained mostly marginal to the policy for science. In this presentation, we will explore in particular the case of the philosophy of science. The lack of collaboration between philosophy of science and science policy is surprising because the two areas seem to converge naturally on topics such as research evaluation, theory appraisal, or how scientific institutions should be organized to maximize scientific progress. Nonetheless, the convergence never happened. In this talk, we will examine the historical, sociological, and epistemological factors behind this failed collaboration focusing in particular on two philosophical theories with clear science policy implications, namely the methodology of scientific research programs of Imre Lakatos and the social epistemology of Philip Kitcher. To sharpen the analysis, we will also compare the case of philosophy of science with that of scientometrics, a discipline that was successfully integrated in the science policies, especially in the current century.

Collaboration Gone Sour: The Case of History and Philosophy of Science

- *Matteo Vagelli*

In my talk, I take up the vexed question of the relation between history and philosophy of science (and between these latter and science) from the viewpoint of its institutional settings and through a comparative analysis between the Anglophone and the French contexts. In the first part I briefly map the field of &HPS by retracing the birth of the first Anglophone &HPS departments and their proliferation in the second half of the twentieth century. Such departments have often shown a low level of interaction between historians and philosophers of science, underscoring the idea of a "marriage of convenience" between the two disciplines, brought together more by funding-shortage than a strong conceptual rationale. In the second part, I focus on the history of the Parisian *Institut d'histoire des sciences et des*

techniques between its foundation (1932) and the post-war period. There, too, the envisaged proximity and cooperation between scientists, historians and philosophers revealed to be largely programmatic. Particularly striking was the lack of a sustained dialogue between philosophers/historians of science and historians of mentality or *Annales'* historians. In the final part of my talk, I compare the two contexts and discuss both the differences and the analogies between them. In the conclusions, I aim to highlight that the criticalities found in both contexts can be at least partly imputed to difficulties deriving from the framing of historical *cum* philosophical studies of science in terms of "research collaborations" between separate disciplines or different kinds of practitioners.

Discussion

36 - Science Diplomacy and Politics - 2
Room: **H.1.302**

Organisers: Matthew Adamson & Doubravka Olšáková

Chair: Simone Turchetti

Session Abstract:
The core literature on science diplomacy has long contended that turning to science in the diplomatic arena opens opportunities to go beyond political differences and tensions (e.g. AAAS/Royal Society, *New Frontiers of Science Diplomacy*, 2010). Recent historical case studies, however, suggest that hidden political ambitions have often shaped science diplomacy initiatives, and that science diplomacy exercises maintain or even exacerbate global asymmetries in power and wealth. This panel, sponsored by the DHST Commission on Science, Technology, and Diplomacy (STAND), explores the new trends in science diplomacy studies by carefully considering the politics of science diplomacy. It considers the tensions between collaboration and competition, the relationship between political parties and alliances to scientific activities, the sorts of historical actors key in science diplomacy, and the place of international and intergovernmental institutions in the evolution of science diplomacy. This panel has great relevance for answering the question of how polities and societies today can maintain constructive relations through science while tackling problems and crises that threaten whole regions and populations. The four papers within suggest the degree to which analysis of the historical foundations of today's science diplomacy is involved in doing that.

The Politics of Technological Instruments or the Whole-Body Counter as a Mute Diplomat
- Clara Florensa
In November 1968 a whole-body counter (WBC) arrived at Madrid (Spain), having been constructed in Los Álamos Laboratory and sent to Madrid "free of charge". The WBC came along with a larger shipment of specialized equipment and cutting-edge technology for radiological protection and environment monitoring. This was part of the Otero-Hall agreement (February 25, 1966), which would be the start of a secret project, code-named Indalo, set to "investigate various health and safety aspects of fissionable materials when released into a rural agricultural environment". This rural agricultural environment was Palomares, a town in the South Coast of Spain where four US nuclear bombs had fallen, due to a plane crash, on January 17, 1966, two of them leaking their content and contaminating a large area with plutonium and uranium.
This talk focuses on the politics of scientific instruments and technology and their capacity to mediate in

diplomatic crisis. With Spain building and starting to run its first nuclear plants (dependent on the US for supplies) and with the effects of plutonium on the body being a world's raising concern, the WBC acted as the perfect "diplomatic gift" in compensation for a radiological contamination that still remains in the zone. The existing "asymmetries in global distribution of techno-scientific resources" paved the ground for the management of that high voltage diplomatic crises by means of technological gifts. These gifts entailed a whole political structure, they fostered laws, commercial agreements, experts exchange, special transports and customs settings, which strengthened the diplomatic relations between the US and Spain. There were more layers of asymmetry in this tale: the Palomares' population did not see the "opportunity" the scientists' involved in the Indalo project interpreted the accident was. These technological gifts were not addressed to them.

A Southern Soft Power? The idea of a House for Brazilian scholars at the International University City of Paris in the Interwar Period

- *Luciana Vieira & Silvia Figueirôa*

The International University City of Paris (CIUP) was organized after the Great War by the French politician André Honnorat, the Rector of the University of Paris, Paul Appell, and the philanthropist and industrial Émile Deutsch de la Meurthe. The CIUP's main objective was to provide accommodation for French and international students and researchers in the expensive city of Paris. Between the 1920s and the 1930s, Canada, Belgium and Luxembourg, Japan, the United States, Indochina, Argentina, and Armenia built houses at the CIUP. The House of Brazil was built only in 1959 as part of the French initiatives for re-establish contact with Brazilian scientific and technical fields after the Second War. However, there were other projects developed between the two countries along the Twentieth Century, related to scientific, university, and diplomatic negotiations, as may be exemplified by the French Mission at the University of São Paulo, the Instituto Internacional da Hileia Amazônica (Manaus), and the Maison d'Auguste Comte (Paris). This paper aims to analyze the first proposal presented by the Brazilian physician and deputy Antônio Austregésilo Rodrigues de Lima to the Chamber of Deputies in 1926. In defense of his law project, as we will argue, he mentioned the social network already existing between professors, scientists, and diplomats from both countries. He also highlighted the patriotic meaning of a Brazilian enterprise in French territory, which could be understood as an attempt to exercise soft power from the south onto the north. This research is supported by the grant 2020/09986-0, São Paulo Research Foundation (FAPESP).

East-European Challenges of Pugwash: Critical Milestones in East-West Cooperation across the Iron Curtain

- *Doubravka Olšáková*

Czechoslovakia and Poland belonged to the most active countries in Pugwash within the Soviet Bloc apart from the Soviet Union which preserved its hegemonic position until 1989. In my paper I want to focus on two critical milestones in the East-West cooperation across the Iron Curtain: Occupation of Czechoslovakia in August 1968 and martial law in Poland 1981–1983. In both cases, Pugwash conferences took place in those countries during a critical period of their history in the second half of the twentieth century: in Czechoslovakia in 1969 and in Poland in Warsaw in 1982. The first conference boosted geopolitical thinking of science diplomats, while the latter was different and openly raised the question of Pugwash's official cooperation with Communist regimes and dissident movements in Eastern Europe. Pugwash approach was openly criticised in Andrei Sacharov's famous letter, which raised the question of whether Pugwash discussion on peace and security 'objectively and impartially precluded criticisms of human rights abuses' (A.Brown, 2012). This question remained opened until the end of the Cold War. The

aim of my paper is to compare both phenomena and identify differences and similarities in contemporary discussions on the role of Pugwash during Cold War crises and discussions of human rights.

Institutionalizing Physics between Global Ambitions and Geopolitical Constraints: The History of IUPAP as a Hybrid Science Diplomacy Agent

- *Roberto Lalli*

The year 2022 marks the centenary of the foundation of the International Union of Pure and Applied Physics (IUPAP). The IUPAP was founded in context of the inter-Allied reconstruction of international cooperation in science following the end of World War I, as one of the disciplinary unions operating under the umbrella of the International Research Council (IRC). For all its internationalist rhetoric, political recriminations harshly limited the international reach of all IRC scientific unions, which was first limited only to countries who were among the war's winners. All through the 20th century, there were momentous changes both in the IUPAP constitution's definition of national membership and in its actual national composition. Obviously, the broader economic and geopolitical contexts strongly conditioned these patterns. Less obviously, each union had its own individual developments, also in those activities their officers recognized to be inherent to what was later called science diplomacy. Based on the recently-digitized institutional archives of the IUPAP and preliminary results of individual projects in the IUPAP history I am co-coordinating, in this talk I offer a long-term analysis of the IUPAP history identifying it as a hybrid science diplomacy agent, which is neither intergovernmental nor fully nongovernmental. I also discuss the specificities of the unions' science diplomacy exercise in comparison with those of similar unions. Such an approach promises to reveal the potentiality and limitations of these institutions in science diplomacy exercises in their historical unfolding as well as the role of specific disciplinary domains in shaping these activities.

44 - Boundings and Unboundings in the Sciences: Gender, Experimentation, and Authority – 2: Experimentation, rights, and resistance of women in science

Room: **H.2.215**

Organisers: María Jesús Santesmases & Andrea Núñez Casal

Chair: María Jesús Santesmases & Andrea Núñez Casal

Session Abstract:

Over the past three centuries, experimental scientific research cultures have been performed in a variety of settings, methods, and means, inventing and modifying technical devices, experiments, and knowledge production. In modern western science, women participated in working spaces, its temporalities, and modes of work in laboratories as well as in other informal and experimental settings of scientific practice. In this context, few women developed an authority of their own while many were regarded as helpers, assistants, or technicians, mostly of men.

STS and historical studies on women and gender belongs to a ubiquitous politics of science that established and consolidated some knowledges and practices as scientific and others as routines; some spaces as domestic and informal (i.e., homes), others as professional and formal (i.e., the university, the industry). The orderings of experimental work and its dissemination established gendered hierarchies of laboratory work at the intersections between spaces of scientific authority in the academia and the

industry and the private spaces of the home.
This panel explores how boundaries, how the scientific ¨orderings¨ of labours, settings, and genders were produced and reproduced over the past centuries in experimental scientific research. This set of contributions shows the interplays between articulations of scientific truths and the experiential politics of knowing, between the official authority of science and the exclusionary practices of ordering genders, spaces, and temporalities. We analyse, within and beyond western science, historiographies of inclusive forms of scientific collaborations and interdisciplinary work, their situated knowledge-practices, gendered cultures, and materials that resisted the status quo of scientific authority.

Between the Home Kitchen and the Hospital Laboratory: Margaret Lasker's Path to Scientific Authority

- *Nurit Kirsh*

Biochemist Margaret Lasker worked at Montefiore hospital, NY, and developed in 1933, together with physician Morris Enklewitz, an accurate method for the differentiation between pentosuria and diabetes. Before they developed their method, standard testing for urine sugars did not differentiate between the six-carbon glucose and five-carbon pentose, and patients presenting with an overabundance of pentose in their urine were often mistakenly treated with insulin.
Research into pentosuria, and mostly its genetic aspects, became Lasker's lifelong passion. She conducted the chief part of these studies in her home kitchen, while at hospital research was not part of her job description, and she mostly performed routine blood and urine analyses. Nevertheless, Lasker became the leading expert on pentosuria, and although her research was performed as an amateur, it was deemed to have scientific merit. The articles she published in scientific journals were comprehensive considerations of the biochemical, clinical, and genetic facets of pentosuria. Many researchers, medical doctors and individual patients sought her out to consult her about this mutation.
I intend to examine how the two different settings of scientific practice were used by Lasker to developed an authority of her own. I will argue that while the domestic setting was critical for Lasker's scientific achievements, her affiliation as a hospital's staff enabled her to develop long lasting connections with individuals with pentosuria and their families, and also creatring her own network of physicians and researchers. Both networks, of families with pentosuria and of scientific colleagues, were essential to her work and provided her with support, motivation and even patronage.

Images, Narratives, and Gender: Research Cultures in Spain during Franco's Dictatorship

- *Ana Romero de Pablos*

Even though María Aránzazu Vigón was one of the first female Spanish scientists to take a place in recognized research spaces within the field of nuclear energy, a photograph published in the magazine Blanco y Negro (April 1960) showed her as unconnected and distant from her work places. This photo, which illustrated an article from a series the magazine dedicated to 'Important Women,' will be the object I use to reflect on how female Spanish researchers, and how they were represented, took part in Spanish research culture during the Franco dictatorship.
The text and photo accompanying it evoke distant and even contradictory discourses. While the content of the interview is full of admiration and amazement regarding the research activity developed by this researcher, the photograph shows her at home in her living room, seated on the carpet, playing with her niece. Although she always worked in public research spaces – first at the Optic Institute and later at the Nuclear Energy Board (JEN) – and it would have been easy to photograph her in one of these work places, the photo published suggests a story aligned with certain authoritarian policies that stereotyped women and stripped them of scientific and technological authority.

I propose an object from material culture, this photograph, to explore other analyses that narrate stories from the sciences that are more critical and inclusive

Women Microbiologists: Approaching the Spanish Antibiotic Research Community (1975-1990)

- Isabel M. Gómez Rodríguez

During the 20th century the scientific community witnessed the consolidation of a new mechanism for recognizing and demonstrating authority. The revolution of bibliometric studies and the institutionalization of Eugene Garfield's *Web of Knowledge* and its indexes—followed by many other systems—generated a tool that inevitably reproduces and reinforces the inherent gendered hierarchies of scientific policy. Any historiographic research with critical intent and centred on the late 20th century must be aware of this reciprocal bias.

Under this premise, the objective of this communication is raising and discussing some approaches to this issue through the research of Spanish female microbiologists working on antibiotics during the 1980-1990s. By questioning the only authority of author databases and indexes and prioritizing a more qualitative choice of sources, such as national academic and industrial journals, relevant and pioneering experimental work on antibiotics—and its resistances—led by women has been found. In order to avoid a history centred in few research groups and in few people—mostly men— in charge and to build an inclusive, communitarian and feminist narrative, women, even those in authority and leading positions, must be actively searched for. In this regard, the selection and acceptance of a certain criteria of relevance is a political decision that determines the subjects of our history, the number of them, the experimental work regarded as scientific and, ultimately, the history we tell.

"Hopelessly Devoted to Science!" Gendered Diplomacy of the Spaces and Material Practices of Science: Cécile and Alexandre Brongniart Couple (19th century, France)

- Martine Mille

Alexandre Brongniart (1770-1847), scientist, founding father of paleo-stratigraphy and with Cuvier of paleontology, was involved in many disciplines and institutions. We postulate that both the material history of science, thanks to intimate sources, and the mobilisation of Geographical Information System (GIS), which materialises the movements and locations of the scholar, allow us to reconstruct, step by step, day by day, the the scholarly work. The spatial study of scientific practices and the analysis of a « diplomacy of spaces » regulated by Madame, constitute one pillars of the study of the scholarly production. The analysis of Cécile Coquebert's practices, « daughter of » then « wife of » scholars, helps to understand her path and thus gradually reveals a scholarly persona (Sibum & Daston , 2003)[3] .The « diplomacy of spaces » of the scholars in the 19th century, a real dive into the dealy life of spouses, from the salon to the library, from collections to totem-objects, through the permeability to the hybridisation of the associated places, thus proves to be an effective tool, providing a privileged access to a form of regulation of scientific practices, through an analysis of privates spaces and places of science (Mille, 2021)[4]. We leave the reductive shores of a representation of women as simple spectators of the place of the science to grasp, with a plethora of fonctions assumed by Cécile, from assistant to scolarly technician, how the wife prouves to be invaluable to the « scholarly factory » of Brongniart.

[3] Sibum, H. Otto, Lorraine Daston . « Introduction: Scientific Personae and Their Histories ». In Science in Context, 1:18. 16. Cambridge: Cambridge University Press, 2003.

[4] Martine Mille, « Pratique des sciences et diplomatie des espaces : les époux Brongniart entre collaboration domestiques et sociabilités savantes en France au XIX e siècle », Cahiers François Viète, Série III, n° 11, Valérie Burgos-Blondelle, Juliette Lancel, Isabelle Lémonon-Waxin, Une histoire genrée des savoirs est-elle possible ? 2021, p. 49-74.

58 - Amateurs and Precision Instruments in the Second Half of the 18th Century

Room: **AY.2.107**

Organisers: Rossella Baldi & Sibylle Gluch

Chair: Sibylle Gluch

Session Abstract:

The figure of the *amateur* is omnipresent in 18th century culture but has been surprisingly little studied by historians of science. While historians of art and collections have paid ample attention to the role and significance of the amateur in the age of Enlightenment, historians of science have mostly focussed on the 19th century. However, any consideration of the figure of the *amateur* in the 19th century that neglects its historical development and multifaceted aspects runs the risk of losing sight of the complexity and original diversity of people and practices comprised by this category. Thus, a narrow understanding of the amateur as a wealthy individual, belonging to the social elite and participating in science mostly in the function of a patron, eventually perpetuates interpretations that originate from 18th century debates – debates that negotiated definitions of scientific knowledge and practices and, most importantly, the question of authority: Who decides which knowledge, practices and practitioners are appropriate for a particular science? In the course of these controversies amateurs tended to be segregated from "proper science" so to be disqualified as non-professionals.

This separation, however, misjudges the complex role that amateurs played in Enlightenment science. As a matter of fact, amateurs held a key role particularly in regard to the technological knowledge economy of the epoch. Our panel aims at examining this role by paying special attention to the involvement of amateurs in the world of precision instrument making. These case studies, drawn from different geographical areas, will unfold a multifaceted vision of the amateur: as investor, agent, collector and networker, as an emissary of craftsmen as well as a craftsman himself. In combining these facets, the amateur will emerge as one of the major actors within the dynamics of 18th century science, technology and innovation.

Shaping a Community of Customers: Amateurs and Josiah Emery's Lever Escapement Timekeepers

- *Rossella Baldi*

Between 1782 and 1794, the London workshops of the Swiss-born watchmaker Josiah Emery (1731-1794) produced some forty pocket chronometers, which were regarded as the most accurate of their time. They were equipped with the lever escapement developed by Thomas Mudge and the temperature compensation device for the balance by John Arnold. Both innovations were adopted by Emery at the request of Count Hans-Moritz de Brühl, for whom the craftsman manufactured the first of the timekeepers.

With little commercial interest, Emery intended them only for a specific clientele of *amateurs*, navigators, astronomers, and a few sovereigns. The amateurs' category was certainly the most conspicuous. These individuals shaped a technological and scientific community using Emery chronometers to carry out astronomical and geodesic research throughout Europe. Subsequently, amateurs like de Brühl, Bochart de Saron, Mercy d'Argenteau, the Duke of Marlborough, and Count Johan Heinrich Knuth became the most active ambassadors for the chronometers. Not only did they promote them throughout their scientific and social network, but they also rigorously tested them and, more importantly, often brokered

further sales on behalf of Emery. Thus their role was fundamental in encouraging an essential technological innovation: from the second half of the 19th century, the lever escapement, in all its forms, became the industry standard for mechanical watches.

Precision and Hauch's Cabinet de Physique, late-18th Century

- Jan Tapdrup

The paper is going to discuss to what extent private cabinets were drivers of scientific progress and precision at a time when university laboratories had not yet been established, lecturers were expected to possess their own collections, and not all learned societies could afford instruments. Our study case will be the *cabinet de physique* established by the Danish Lord High Steward Adam Wilhelm Hauch around 1790-1800. The collection wasn't used only for didactical purposes but also for research. It still exists and counts 800 artefacts.

While being in the service of the Danish king, Hauch also published several papers in international scientific journals and became a member of many learned societies. He was the president of the Royal Danish Academy of Sciences and Letters and an honorary doctor at the University of Copenhagen; he was offered a professorship at the University of Göttingen but declined it. Hence, was Hauch an a*mateur*? Did he do quantitative research and to what extent his instruments can be regarded as precision instruments? His cabinet was considerable but had been collected within a short time; therefore, its items reflected the standard chemistry and physics instruments at the time comprised a wide range of demonstration apparatus and models, not associated with precision. Furthermore, Hauch's instruments catalogue related to earlier traditions and instrument catalogues like Nollet's *Lecons de Physique Experimentale*.

The Eighteenth-Century 'Amateur' Scientist at Home

- Leonie Hannan

This paper draws on research for a forthcoming book which focuses on the home as a site of knowledge-making for people who were not typically acknowledged as 'scientists' in the eighteenth century or in subsequent historical accounts. As Christine von Oertzen et al. have emphasised, when "attention is paid to gender and geographies, and when hierarchies of knowledge production are rejected" a different kind of "knowledge society" emerges. Diverse examples of *amateur* scientists will show that authority was constructed in a variety of ways, depending on gender, class, region and other dynamics, and that it appeared in surprising quarters. Dublin apprentices in the print and linen industries are considered alongside an English Baroness, rich from the business of Empire, for their pursuit of astronomy and engagement with the instruments and instrument-makers of that field. A range of other case studies drawn from the archives of the Society for the Encouragement of Arts and Sciences and contemporary print culture will further demonstrate the active role amateurs played in the technological knowledge economy of the Enlightenment. This paper proposes homes as spaces of emergence, in terms of the drivers, practices and techniques of science, but also as places where insight and innovation could gain traction. The variegated demands, affordances and schedules of domestic and familial life, provided not only the conditions for enquiry but also, often, the motivation. Intellectual labour was just one facet of household work and scientific activity operated within and around the rhythms of provisioning, economy, sociability and care. As such, the non-professional, concerned with the complex business of home, was well-placed to engage with intellectual life in this period. Whilst this panel is concerned with the concept of the 'amateur', this paper also questions the language we use to denote scientific activity that sits outside of traditional frameworks and seeks to avoid the very many troublesome and unequal binaries that frame our thinking.

Discussion

65 - Religion, Institutions, and Politics in the Cosmological Debates of Early Modern Catholic Countries

Room: **H.1.301**

Organiser: Rodolfo Garau

Chair: Pietro Daniel Omodeo

Session Abstract:

This panel investigates how political, religious, and institutional motives surrounded, conditioned, and informed the development of the cosmological discourse in early modern Catholic countries.

Between the 16th and 17th centuries, cosmology was at the centre of conflicting cultural agendas because of its theological, metaphysical, and anthropological bearings. In Catholic countries especially, the organization and direction of scientific institutions became a fundamental asset to hegemonize the intellectual discourse. The processes that led to the censure of Copernicus and Galileo became paradigmatic in the history of science, raising questions on 'modern' scientific rationality and its relation to religion.

While scholarship provided significant advances, an understanding that integrates the various dimensions (political, religious, and intellectual) of cosmological debates in Catholic Europe is still a desideratum. For scholars prevalently focused on northern Europe when investigating the role of religious identities and universities in the formation of the early modern science, while comparatively less attention was paid to southern countries. In particular, the function of political actors as mediators between the truth claims of science and religion still has to be thoroughly investigated. Scientific knowledge, rooted in particular in geo-political and institutional settings, constantly revised its relation with the universal truth that was repeatedly reaffirmed as a form of loyalty to the 'universal' religion. In this context, the endorsement or the censorship of institutions, theories, or individual scholars became intrinsically political.

Collectively, we investigate such entanglements as expressions of the early modern cultural politics of science. In particular, we will consider the political and institutional dimensions of cosmology in the confessional context of Counter-Reformation Europe through a series of comparative case studies, addressing the interplay between political interests and religious agenda at the time of the Counter-Reformation, the expansion of court society, and the formation of modern states, and how institutions conditioned the cosmological discourse.

Regiomontanus' Paduan Lecture of 1464, the Byzantine Intellectual Heritage, and the Greco-Arabic Roots of Astronomical Studies in Early Modern Italy

- *Alberto Bardi*

The inaugural lecture, or oration, delivered by Regiomontanus at the University of Padua in 1464, is deemed a document of remarkable significance in the history of science. Although it has attracted much scholarly attention, few efforts have been directed towards identifying the traces of Byzantine influence it might carry, that is to say, the extent to which Regiomontanus might have been influenced by Bessarion's views. This paper responds to the need for such a study, arriving at the following conclusions: first, Regiomontanus's praise of astrology is in line with Bessarion's reaction to the official decisions taken against astrology in Constantinople at the Council of 1351 — decisions which were ultimately rooted in

the confessional struggles between the Churches of Constantinople and Rome; second, the legitimation of the Greco-Arabic roots of astronomy in an institutional context, as undertaken by Regiomontanus, is in accordance with the intellectual influences Bessarion had absorbed in his youth in Constantinople; third, contrary to some claims, it is likely that Regiomontanus does not adhere to a humanist anti-Arab agenda, but rather that his views on the history of mathematics are a consequence of the Greco-Arabic heritage of his patron, the lack of Arabic translations, and the indubitable absence of modern philological concerns of his time (philology *ante* Lachmann).

Astrology and the Meaning of History: Girolamo Cardano and the Roman Inquisition

- *Jonathan Regier*

Historians generally characterize early modern disputes between the Roman Catholic Church and natural philosophers as fundamentally a matter of Biblical and doctrinal authority; hence, when natural philosophers overstepped their bounds, the Church took action. I would like to challenge this characterization, not because I believe it incorrect, but rather because I think it can mask important nuances. In my talk, I would like to consider how, in the decades following the Council of Trent, censors of the Roman Inquisition and Index viewed astrology as a threat to the Church's *conception of history*, both its long-term history and its "Counter-Reformation" present. I will focus on the sixteenth century physician, philosopher and astrologer Girolamo Cardano, and on his Inquisition and Index censors. From one perspective, Cardano's Inquisition trial is more conceptually troubling than Bruno's or Galileo's; by and large, it was not about central points of Christian doctrine, nor was it about Biblical interpretation. His censors even targeted what, from Aquinas to Cardano's era, should have been legitimate examples of astrological practice, i.e., general prognostications based on natural causes and the ways those causes can influence human behavior (indeed, their criticism encompassed not only his astrology but also its physical or cosmological basis). I will argue that the Cardano case represents, at least in part, a clash of expertise in a rather universal and perhaps transhistorical sense: who has the authority to interpret the past and advise us on the future?

Giovanni Battista Riccioli (1598-1671) and the Quest for the Best Astronomical Theory

- *Flavia Marcacci*

The condemnation of Galileo Galilei (1564-1642) by the Tribunal of the Inquisition in 1633 had long-lasting repercussions during the rest of the century among astronomers who were discussing about the planetary systems and the centrality of the earth. Those who had read the condemnation of the *Dialogue on the Two Greatest World Systems* and Galileo's recantation understood that the problem was that Galileo had written about Copernicus's theory presenting it as demonstrated. Astronomers working in Catholic countries could not ignore this fact. Both laymen and members of the clergy had to exercise caution. Both the religious and the secular authority of the Roman Church depended on the scientific credibility of the arguments against the earth's motion. The Jesuits had several prominent astronomers and some of them considered it their duty to vindicate the Inquisition's decision. They found it convenient to appeal to the system and accurate work of the Protestant astronomer Tycho Brahe. Among them, the most distinguished was Giovanni Battista Riccioli (1598-1671), who published in 1651 the most critical work in the field, the *Almagestum* novum. It has sometimes been said that Riccioli embraced the Tychonian system out of a servile desire to submit to ecclesiastical censorship, but he had excellent reasons for doubting that the Earth was in motion. As we show in this article, he endeavoured to improve the model of Tycho Brahe after having made a remarkable number of telescopic observations and after reformulating the concept of astronomical hypothesis.

Gassendi vs Morin: Galileanism, Astrology, and Patronage.

- Rodolfo Garau

From 1642 to 1644, the philosopher Pierre Gassendi (1592–1655) published a series of letters containing a defence of Galileo's theory of motion. At the behest of his patron de Valois, Gassendi reported on the first performance of Galileo's mental experiment of the body falling from the mast of a moving ship. Moreover, these letters applied Galilean relativity to Copernican cosmology, providing one of the first statements of the principle of inertia in modern times. These letters triggered a reaction from Jean-Baptiste Morin (1583–1656), who published a polemical response entitled *The Broken Wings of the Earth* (1643), suggesting that the opinions of Gassendi in matters of astronomy were not only wrong but potentially heretical. Morin, who was a mathematician at the *Collège Royal*, is also credited to be the last astrologer to occupy a chair in a French institution of learning. The polemic that ensued spanned for a decade and involved other prominent French scholars of the period; it is credited to have marked the "public execution" of astrology within the French intellectual context. In addition to analyzing the content of this polemic, the goal of this paper is to address the system of patronage that determined the possibility of expounding before, and publicly defending then, Galilean and Copernican cosmologies in early modern France. I argue that the exchange between Gassendi and Morin shows how shifting political endorsements and institutional contexts oriented the acceptance of Copernicanism in early modern France, and, parallelly, the marginalization of astrology.

68 - Computing Politics in Late 20th and Early 21st Century - 2

Room: **AW.1.120**

Organisers: Arianna Borrelli & Liesbeth De Mol

Chair: Arianna Borrelli

Session Abstract:

This Symposium offers a historical contextualization of the increasingly pervading use of computing in practically all areas of human endeavour. These developments are both shaped by political factors and have political implications whose breadth and depth are only recently being appreciated. A good example is "artificial intelligence", which has been hailed as a solution to long-standing problems, or denounced as a potential tool of discrimination. In political debates the historical dimension is often oversimplified, if not fully absent, and with this Symposium we wish to showcase research results by scholars investigating the history of these topics - scholars who come both from history and from other disciplines.

The contributions look both at the background and agendas of the historical actors developing and using computational tools in different contexts and at the technical features of the tools themselves, which could in turn at least partially shape both aims and conceptual frameworks of their users. We believe this and similar research can contribute to political discussions and open up new avenues of reflection, and wish to bring it to the attention of the broader community of historians of science and technology, where it has so far not been very present.

The Symposium has three parts. The first one presents examples of how specific computing methods and tools could become the shared core prompting the emergence of new communities. The other two parts focus on the history and politics of what is today usually referred to as "artificial intelligence," a term now comprising not only logical-mathematical formalization of thought processes, but also - and indeed primarily - methods like machine learning. A commentary and general discussion conclude the Symposium, which is organized by the Interdivisional Commission on History and Philosophy of Computing (HaPoC hapoc.org) of the Division of the History of Science and Technology and the Division

of Logic, Methodology and Philosophy of Science and Technology.

Expert Systems as a Bridging Technology: From Technology Policy to Innovation Policy in the Federal Republic of Germany

- Jakob Tschandl

After a period of social democratic governments in West Germany, the government changed in 1982 to the Christian Democratic Union until 1998. During these 16 years, research and technology policy was fundamentally changed. After a time, in which the modernization of the national economy was combined with social reforms, the 1980s saw an R&T policy aimed at the competitiveness of the state and thus accelerating technological innovation. One testing ground were knowledge-based and, in particular, expert systems, which dominated the emerging research field of "artificial intelligence". Initial commercial successes of expert systems in the U.S. raised hopes that AI could make the leap from research laboratories to industrial applications. In 1982, Japan focused on this technology with its "Fifth Generation Computers Program". The USA and the European Community responded to this challenge with their own comprehensive funding programs. The Federal Republic of Germany reacted to the new situation (seeking to catch up with the USA and challenged by the emerging Japan) with its own funding initiative for expert systems. Even though expert systems ultimately failed to gain acceptance, new types of institutions were created in an effort to bring this technology to application. An example of this is the founding of the German Research Center for Artificial Intelligence (DFKI) in 1988, which was the first German research center organized as a public–private partnership. In my presentation, I want to use the example of expert systems to show how a fundamental political shift from a technology policy to an innovation policy took place, which merged the fields of science, industry and politics more closely.

The German Research Center for Artificial Intelligence (DFKI)

- Rudolf Seising

The German Research Center for Artificial Intelligence (DFKI) was founded as a non-profit limited liability company (GmbH). This took place within the framework of an agreement concluded by several industrial companies, research institutions and professional associations with the then Federal Ministry of Research and Technology (BMFT), the federal states of Rhineland-Palatinate (Rheinland-Pfalz) and Saarland and the universities in Kaiserslautern and Saarbrücken on 4 July 1988. This was preceded by more than two years of exploratory work based on initiatives by individual AI researchers in West Germany. When the institute was founded, the so-called knowledge-based systems were the focus of the AI research plans (expert systems, deduction systems, natural language and image understanding systems). To date, other research topics have been added: e.g. autonomous systems, learning systems, human-machine interaction and robotics.

After 2000, in addition to the original locations in Saarbrücken and Kaiserslautern, further locations and branch offices were founded: Bremen, Siegelbach, St. Wendel, Osnabrück/Oldenburg, Lübeck, Trier and Berlin. After more than 30 years, the DFKI has grown to become one of the largest AI research centres in the world with over 800 employees. This paper attempts to reconstruct the history of the DFKI's development from the vision of a few scientists to the science policy decisions to its realisation based on archive materials and interviews with actors at the time.

An Interdisciplinary Approach to the Design of Autonomous Systems

- Daniel Trusilo

Historically, parties to armed conflict have been required to comply with the principles of distinction, proportionality, and precautions in attack based on the 1899 and 1907 Hague Conventions and the 1949 Geneva Conventions and their 1977 Additional Protocols. However applying normative values and laws to the real-world operationalization of autonomous systems is problematic. This is especially true when human lives are at stake. The use of Autonomous Weapons Systems (AWS) to lethally target humans, which was officially documented for the first time in March 2020, presents a range of problems to notions that have guided international humanitarian law (IHL) since its inception. Namely, how can human responsibilities (both ethical and legal), be accounted for when autonomous systems or computer algorithms are involved? In this talk, I will propose an interdisciplinary approach toward the design of autonomous systems. In the absence of government regulations or international agreement on what is unacceptable, it is incumbent on the community of people working to develop new technologies to consider the impact of this new technology on society and the conventions that have applied to conflict for more than a century. Therefore, I will argue that conceptual frameworks and practical tools can provide the basis for philosophers, lawyers, ethicists, engineers, and operators to work together in the design process to develop systems that are built through informed discussion and clear intentions.

72 - Counter-Knowledge – 2. In Context

Room: **AW.1.125**

Organiser: Alexander von Schwerin

Chair: Alexander von Schwerin

Session Abstract:

Counter-knowledge–or critical knowledge–has long been at the heart of activism within academia and beyond. Alternative movements have produced critical and alternative forms of knowledge, most prominently in the so-called New social movements of the 1960s and following decades, e. g. the environmental and anti-nuclear (protest) movements. Also, different strands within the countercultural movement tried new forms of life together including their theoretical, practical and technical bases, e. g. housing, energy production, agriculture, child care.

This series of three symposia seeks to elaborate further on the process and forms of knowledge production at the intersection between academia and the New social movements. The term counter-knowledge suggests a close relationship between on the one hand established science and technology and, on the other hand, alternative viewpoints/accounts critical of the mainstream position. This relationship seemed to be a main feature in the history of counter-knowledge, though it has been challenged constantly by esoteric forms of knowledge including conspiracy theories, quack medicine, and fake science. The aim is to foster and discuss historical studies that explore and bring forth new insights into the historical conditions in which counter-knowledge flourished, the form that it took and its effects.

In symposium I, we focus on forms and practices of counter-knowledge.

In symposium II, we focus more counter-knowledge in context.

In symposium III, we explore the epistemic tension within the realm of counter-knowledge.

Occupational Medicine in Italy: Radical Movements and the Emergence of a New Approach (1960-1980)

- *Roberto Gronda, Mauro Capocci & Giulia Frezza*

Our paper focuses on the 'Health in the Factory' movement in Italy and how it connected with academic physicians and scientists. Our historical reconstruction draws on archival sources from workers' unions (e.g., the Centro ricerche e documentazione rischi e danni da lavoro, a collection spanning from the 1960s to the 1980s) as well as several published works (authors including, but not limited to, Giulio Maccacaro, Ivar Oddone, Giovanni Berlinguer) pioneering a new focus on the relationship between science, medicine and power. In the late 1960s, scientists got involved by social movements in devising a 'radical science' approach that challenged the fundamental elements of scientific practice. In the fields of public health and epidemiology, physicians started to revise their practice to meet the demands of the workers. New conceptual tools were required in order to turn personal perceptions (environmental factors, symptoms) into statistically sound medical data. Internal surveys and new dedicated forms of investigation among workers were conducted, and committees were set up in factories, featuring workers and physicians alike. This process resulted in the struggle for the implementation of risk prevention and reduction measures, in the dissemination of knowledge outside academy, and in academic debates about the scientific legitimacy of data and methods. Our investigation, moreover, highlights the idea of 'permeable interfaces' allowing for the production and the negotiation of knowledge and power. In the paper, we discuss the potential of this innovative approach as a catalyst of responsible research in relation to the recent citizen science movement.

Nuclear Counter-Knowledge: Counter-Experts and Nuclear Risk in West Germany (1970s-1980s)

- *Stefan Esselborn*

Nuclear energy played a central role in the history of counter-knowledge in the Federal Republic of Germany (FRG). On the one hand, the opposition to nuclear energy was arguably the most important catalyst for the institutionalization of the scene, and remained a central to its development and public perception well into the 1980s. On the other hand, nuclear energy was also one of the most technically complex and scientifically challenging topics within the thematic spectrum of German counter-experts. This made the "nuclear-oriented" branch not only the perhaps most "scientific" within the counter-expertise scene, but also exposed it regularly to charges of erecting a "counter-expertocracy".

The contribution proposes to investigate the role of the nuclear energy controversy in the emergence of counter-expertise, and the contribution of counter-expertise to a history of knowledge of nuclear power in the 1970s and 1980s. Concentrating on expert discussions around key events such as the 1977 Wyhl trial, the *Deutsche Risikostudie Kernkraftwerke,* the *Enquete-Kommission zur zukünftigen Energiepolitik* (1979-1981), and the 1986 Chernobyl accident – it will ask to what extent nuclear counter-experts' participation in official advisory bodies and in state-funded "parallel research" introduced new ideas into the public discourse, and to what extent it served to restabilize the public's trust in technoscience. The contribution will be based on research in the archives of "established" as well as "critical" research institutions, contemporary specialized publications and general media, and oral history interviews with several key actors.

Criminal or Sick? Experts, Activists and the Decriminalization of Homosexuality in Post-War Austria

- *Nina Kramer*

An anti-feminist movement, recently formed across Europe, Russia and the USA and supported by right-wing and church groups, is mobilising against equal rights of LGBTQ people and against gender studies as an academic discipline. Building on a collective research project at the University of Vienna and QWIEN,

Centre for Queer History Vienna, this paper situates the current backlash in a longer history in which LGBTQ people have inched from marginal positions closer to the mainstream, engaging legal, scientific, and medical authorities along the way. Specifically, it uses the decriminalization of homosexuality in post-war Austria as strategic lens to understand the historical conditions in which counter-knowledge flourished, the form that it took and its effects. Criminal persecution of (mostly male) homosexuals surpassed Nazi era levels in the 1950s. A small number of human rights advocates like the director of the Graz University Library Wolfgang Benndorf or the writer Erich Lifka offered some alternative to mainstream homophobia, but the illegality of homosexuality constrained their arguments and more generally prevented the formation of a broad social movement. Meanwhile, there was a lively debate within the mainstream about whether homosexuality should be decriminalised, which took place behind closed doors in a parliamentary commission. Various experts confronted each other in 1957, drawing on different traditions of psychiatry and sexology, but eventually agreed that homosexuals were sick rather than criminal offenders. This discursive shift was important for making possible the decriminalization of homosexual acts among adults in 1971. As lesbian and gay activists organized, the pathologization of homosexuality came under attack, especially through interventions of critical psychologists challenging their own field in the 1980s.

How Patient Activists in Canadian Clinical Cancer Research Became Participants in the Construction of Scientific-Medical Knowledge, 1961-1991

- Fedir Razumenko

Throughout the second half of twentieth century, the social and political changes were unmasking systemic forces through numerous human-rights movements. Mainstream medicine participated in perpetuating social stereotypes and ill-health. Willingness to acknowledge and confront these failings prompted the shift toward patient-oriented medicine (Duffin, 2021). Steven Epstein (1995) has argued for the importance of studying social movements that engage with expert knowledge to elucidate mechanisms of knowledge construction. Barron Lerner proposed in The Breast Cancer Wars (2001) that American female patients encountering the disease were both actors and reactors who redefined the network of cancer research and care in the 1970-1980s.

In the Canadian context, historians produced little scholarship to appreciate how clinicians, non-medical professionals, and policymakers balanced decisions on the relationship between scientific-medical pursuits of knowledge (Hodges et al., 2020). This paper analyzes how a gradual shift from a predominantly biomedical and paternalistic approach to a patient-oriented model in Canadian oncological research and care occurred. I argue that Canadian cancer activism since the 1960s made patient-oriented approaches to oncological research and care possible through amassing different forms of credibility which complemented expert knowledge in the long run. This was critical knowledge. Thus, cancer patients became genuine activists in the construction of scientific-medical knowledge. Through law courts and the media, patients demanded a voice in determining more compassionate outcomes, and they wanted greater access to novel treatments, more involvement in control of research, and harsher punishments for wrongdoing. Examining specific case studies of clinical cancer investigations, this paper will broaden our understanding of the reasons why the medical community has prioritized the patient-oriented framework.

118 - Values in Science and the Authority of Science

Room: **UB.2.147**

Chair: Hannes Van Engeland

Scientific Truth and Scientific Authority: Merits and Limits of the Sociology of Scientific Knowledge

- Morgan Adou

Sociology of scientific knowledge (SSK) constitutes a shifting point in the history of sociology of science. David Bloor, a leading figure of SSK, advanced in the seventies a "strong program" for the social study of science. This strong program had a revolutionary aspect by renewing entirely the traditional account of scientific knowledge and its view of scientific truth and scientific authority.

In this talk, I shall reconstruct and examine the main arguments of SSK in favor of a new understanding of the notions of scientific truth and scientific authority, which were at the center of the attacks against science during the recent sanitary crisis (take for example the populist claim that "the authority of science is illegitimate because science is not objective and belong to the elite", or some anti-vaccine's claim that "it is not a scientific truth that vaccination is preferable since there is not scientific unanimity on this").

I shall then argue, first, that these attacks are based on the traditional view of science, scientific truth, and scientific authority that SSK rejects as inaccurate and misleading; second, that contrary to what is usually thought, lessons can be drawn from SSK's analyses to protect and rehabilitate the authority of science; third, that they are insufficient, however, to meet the challenge raised by radical sceptics and relativists, and that SSK's analyses even gives ammunition to them.

What Kind of People Make Good Scientists? Knowledge and Virtue in Postwar America (1950–2000)

- Sjang L. ten Hagen and Kim M. Hajek

What kind of people make good scientists? What personal qualities, or "virtues," in other words, do scientists expect their peers to possess? According to the 1991 ethics code of the American Physical Society, "honesty must be regarded as the cornerstone of ethics in science," while a "creative imagination" was recommended by a 1960s undergraduate history textbook. Our paper explores the relevance of such personal qualities to knowledge-making in recent American academic cultures, focusing on disciplines of physics, history, and psychology. Through a comparative analysis of introductory textbooks, book reviews, and codes of ethics in these disciplines, we show that American scientists from across the academic spectrum routinely talked about virtues during the decades between 1950 and 2000. When inducting students into a discipline, evaluating peers, or codifying their professional standards, scientists regularly evoked each other's personal character traits. Strikingly, physicists, psychologists, and historians also drew upon very similar repertoires of virtue: to do proper scientific research or publish results required carefulness, critical power, and objectivity. Some virtues, in contrast, were discipline-specific: for example, only psychologists advocated the importance of wisdom, whereas the virtue of judiciousness was particularly endorsed by historians. The relevance of these personal qualities in postwar American knowledge disciplines is surprising in light of portrayals of the postwar period as a time well "after virtue" (in Alasdair MacIntyre's phrase), when scientific activity was shaped by impersonal criteria and institutional systems. As our paper demonstrates, however, postwar American science was still a context in which virtue mattered.

Gender, Ethnicity, and the Limits of Institutional Leadership in the Discovery of RNA Splicing

- Pnina Geraldine Abir-Am

This talk focuses on the role of gender and race in depriving two woman scientists of East and South Asian origins, from receiving credit for their key roles in the discovery of RNA splicing.[1] The talk discusses the contributions and careers of Louise Chow, born in China and raised in Taipe, and Sayeeda Zain, born in India and raised in Pakistan. Both became full professors at the University of Rochester Medical School in New York (NY) state, USA, but were not recognized for their key roles in the discovery of RNA splicing. Two male lab directors of British and North American origins, Richard Roberts of Cold Spring Harbor Laboratory, NY, and Philip Sharp of MIT, (Cambridge, MA.) both in USA, shared the Nobel Prize for this discovery in 1993. Belatedly, Louise Chow was elected to the National Academy of Science in USA in 2012; Sayeeda Zain became a prolific inventor. The talk further interrogates how scientists in leadership positions, such as lab directors and directors of research institutes, engaged in a politics of science which marginalized women scientists in general, and women scientists of color, in particular. The talk seeks to clarify how science policy interacts with gender and race bias to produce a politics of science which leads to a persisting under-representation of women in science.

1)The discovery of RNA splicing is widely seen as the 3rd most important discovery in molecular biology. By revealing that eukaryotic messenger-RNAs are not co-linear with DNA but rather are the products of multiple splicings of non-contiguous segments of a primary [RNA] transcript of the genome, the discovery led to a new understanding of biological regulation. It clarified why a smaller number of genes is sufficient to produce the large number of proteins required to maintain a wide variety of life functions. The discovery also led to a better understanding of diseases resulting from splicing errors.

For background on all the women co-authors see "The Women Who Discovered RNA Splicing". (https://www.americanscientist.org/article/the-women-who-discovered-rna-splicing)

Behind the Exhibit, beyond the Confidential: The Volta 1939 Conference

- Erika Luciano

Established in April 1930, the Volta Foundation was one of the centers annexed to the *Accademia d'Italia* and played a central role in the fascist foreign policy of science because it financed dozens of foreign travel fellowships and nine international conferences, the first dedicated to *Nuclear Physics* (1931) and the last one before the war on contemporary *Mathematics and its applications* (1939).

Postponed due to the outbreak of the war, and finally cancelled, the Volta 1939 conference was organized by Francesco Severi and Enrico Bompiani, two scholars of the elite of Italian mathematics in the Fascist period.

This event deserves an in-depth analysis under a double perspective: political and mathematical. Beyond the exclusion of Jewish mathematicians, his organization was in fact an exercise of science anti-diplomacy. All aspects of the event, from the agenda to the selection of speakers, were managed by Severi and Bompiani, who meant to take advantage of the conference to display their personal conception of the history and political geography of mathematics, and to exhibit the *Fuhrende Stellung* of Italian mathematics *vis-à-vis* anglophone countries in particular.

Considering the extensive correspondence kept in the archives of the Academy of Italy and the Italian Mathematical Union, the paper will focus on the behind-the-scenes to this virtual conference, scrutinizing the practice of international cooperation and propagandistic uses of mathematics in Fascist Italy.

References:

Luciano E. 2016. L'Accademia d'Italia e la diffusione della cultura matematica all'estero. *Physis*, 51: 61-73.

Capristo A. 2006. L'alta cultura e l'antisemitismo fascista. *Quaderni di Storia*, XXXII: 165-226.

126 – Education, Communication and Popularization

Room: **AY.2.108**

Chair: Maria Paula Diogo

Physicians and Republic of Letters in Early Modern Practice-oriented Genres of Literature

- Bohdana Divišová

This paper will focus primarily (but not only) on *consilia* – a practice-oriented genre of early modern medical literature. In the 16th and 17th century, *consilium* – which is the term describing a written account of a single patient´s case shared between two (or more) physicians – became a common component in the practice of many doctors of medicine and collections of *consilia* were often published in print.
It is well-known that *consilia* represented an important connecting link within the *Respublica medica*, but how exactly did the communication and cooperation take place? Who did an attending physician turn to, if needing expert advice? A famous professor of medicine, or some friend of his? What circumstances could have influenced the choice? Could the patient involve himself in the selection of a consultant? This paper will argue that the answers to those and similar questions can be obtained through the study of *consilia* and related genres of literature, such as medical letters, observations, casus etc., which reveal many details about the relations among physicians, bring information regarding both their collaboration as well as their potential conflicts and discrepancies that shaped the medical community.

A 'Political and Politico-Academic Attack': The Working Party for a Traveling Computer for Sixth Forms

- David E. Dunning

In the early 1960s, several leading British computer scientists organized to mount, in their words, "a really strong attack, political and politico-academic," on what they saw as the problem of inadequate state investment in computing education. Convinced that American universities were pulling ahead in the race to train the leaders of a coming computer revolution, they developed and gained considerable support for a plan to bring computers to students even before they reached university. By installing a computer directly in a van, they proposed to create a traveling opportunity for sixth form students to program and see their programs in action. They secured enthusiastic endorsement from schools, including such bastions of tradition as Eton and Harrow. As part of the same campaign, they also put together a proposal for an A-level curriculum in computing. The specific visions of the Working Party for a Traveling Computer for Sixth Forms seem not to have been realized, but the records of this project, preserved in the papers of British computing pioneer Christopher Strachey, document a significant liminal moment: the coming importance of computing education could be glimpsed and persuasively described, but its forecasters could not quite enlist the sort of funding their plans required. (And they did get their visions priced: Computer Engineering Limited quoted "£1,600 extra for installation in a lorry.") Reconstructing the scheme for a traveling computer, this paper will illuminate the early seeds of the now orthodox stance that computing education is a crucial concern for state policy and spending.

Visions of Science and Technology: How two Portuguese Generations Look and Perceive Science, Technology, and Popularization of Science

- Inês Nepomuceno Navalhas

In a context in which it is increasingly important to be aware of science and technology themes, and that has been particularly exacerbated by the pandemic that marks the end of the second decade of this century, it is important to understand how we inform ourselves about these topics.
Taking a specific sample, a questionnaire was applied to two different generations of qualified public

(teachers and students from a Portuguese University – NOVA University of Lisbon, in science and engineering areas), in order to understand the difference in habits of reading science dissemination books and if there was a gap between these generations in the way they access to scientific information. There was also questions related to the type of information sources, the perception of science, the level of information and interest in science and technology, science fiction reading habits, among other indicators.

This comparison between the two generations allowed an understanding - although limited to a specific University, area of knowledge, and time – that showed some differences regarding, for example, reading habits: there is a concerning 50% difference between the teachers generation and students generation, which means that students now read 50% less science dissemination books than teachers.

In this paper, it will also be possible to draw some inferences about the scientific knowledge access, particularly the platforms where one can, today, find and read all the scientific information, which is changing the way all generations read and contact with knowledge.

Gymnasium professors awaiting a generational change and their significance for the circulation of knowledge

- Tomáš W. Pavlíček

The author analyses to what extent secondary schools were **laboratories of knowledge**, nurseries for the **training** of future scholars and **opportunities for self-fulfilment** of teachers who patiently waited for a **generational** change at university to be appointed full professors and quit their secondary-school jobs. Wasn't this patience a stylisation by successful scholars? Didn't this system lead to a further exclusivity of the male academic domain?

The paper focuses on images of science in Czechoslovakia (1918-1950, the education system reform) from the perspective of professors of mathematics who had international contacts and presented the image of science to their students. How did they affect the debate about philosophy of science based on the reception of Einstein's ideas? Was this circulation of science unique to Central Europe?

A generation of professors had a common trait of internships with scientists abroad: Václav Hlavatý (promoter of Einstein) with J. A. Schouten, Bohuslav Hostinský (critic of Einstein) with G. Darboux, Otakar Borůvka with E. Cartan, Vladimír Kořínek with E. Artin. Were they able to pass their experience on? Did their students appreciate these contacts after WWII, when the opportunities for internships were limited and the books were either unavailable or only translated to Russian?

Circulation of science offers answers to those questions. It is possible that the young generation introduced new research and methods, but it still perceived the images of science and network according to the tradition of its professors. The author interviewed some scientists of this generation (Martin Černohorský, Luboš Perek, Jaroslav Kurzweil).

16:30-18:00 - *Sessions*

2 - Government and the Polar Sciences, 1818-2000

Room: **H.1.309**

Organiser: Edward Gillin

Chair: Sam Robinson

Session Abstract:

The cultivation of scientific knowledge of the polar regions has historically been inseparable from broader political claims over the Arctic and Antarctic. Be it for potentially profitable new trade routes or the exploitation of natural resources, national governments have been eager to mobilize scientific research as a powerful strategy for demarcating territory. This panel explores these links between state policy and the cultivation of the polar sciences. Focusing on British research programmes and exploration since the launch of the Royal Navy's search for the North West Passage in 1818, our papers explore the role of government in the fashioning of new philosophical knowledge of these regions. From the makeshift observatories and expeditions of the nineteenth-century, to the more formalized state-orchestrated projects of the twentieth, the British government's pursuit of empirical data from the polar seas raises wider historical questions over international diplomacy and multicultural encounter. In 2022, understanding the links between state policy and polar scientific research could not be of greater relevance: for today's debates and political wranglings over climate change and impending environmental calamity, both the Arctic and Antarctic icecaps feature prominently as barometers of the health of the planet. Our four papers collectively demonstrate how these scientific-political connections have a rich and complex history, dating back over two hundred years. Few territories on Earth have presented such highly contested sites of scientific inquiry as the polar regions.

The Nature of Empire: Imperial Science and the Polar Observatory, 1818-1860

- Edward Gillin

Between 1818 and the 1850s, the Royal Navy undertook a series of Arctic expeditions, in the hope of discovering a North West Passage between the Atlantic and Pacific, that were to transform the nature of polar science. Sheltering during long winters, in which further exploration was impossible, crews frequently undertook rigorous programmes of scientific investigation into a range of natural phenomena. The cultivation of the polar sciences, through the naval apparatus of the British "fiscal-military state", became an increasingly central part of nineteenth-century exploration. However, to obtain accurate measures of natural phenomena involved the construction of temporary observatories. No other architectural works demanded such careful social and physical organization. Expeditionary observatories were intended to discipline disparate territories and produce controlled spaces in which natural phenomena could be isolated and reduced to recordable data: transforming an iceberg, Inuit tent, mutineer's hut, or shipwreck debris into a site of knowledge production sustained idealized perceptions of imperialism bringing "civilizing" order to all parts of the world. Yet realizing such discipline in the polar regions proved difficult: these buildings did not constitute an uninterrupted imposition of imperial values over space, but were contested, locally shaped constructions. Polar observatories involved the mobilization of local building techniques and materials, resulting in a varied collection of impermanent architectural projects. This paper explores these early polar observatory efforts and argues that the knowledge and experiences that naval officers secured in this work shaped the formation of Britain's

expanding network of state-financed colonial observatories.

"Continued Display of State Activity": The Discovery Investigations (1918-1951) and State Science in the British Antarctic

- *Daniella McCahey*

In 1908, the British Empire began the process of formally claiming what would eventually be the majority of the Antarctic continent, as well as its surrounding waters. This watery territory, some of the world's richest whaling and sealing grounds, was a source of enormous resources. In response to great attention paid to these waters by whalers and sealers around the world, the Colonial Office began managing the marine mammal population through licenses and taxes. But just like in their imperial settings elsewhere, the Colonial Office used science as both a way to better manage the territory and to justify their sovereignty claims over the region. In 1918, the Colonial Office launched the Discovery Investigations, based on the sub-Antarctic island of South Georgia, a series of marine science investigations meant to better maintain the Southern Ocean whale population. These sea and shore-based investigations lasted until 1951, eventually publishing 38 volumes of research on the Southern Ocean. In 1955, during a period when both Chile and Argentina contested the sovereignty of the Falkland Islands Dependencies, Great Britain filed a case with the International Court of Justice in which it used its history of funding marine science and whaling regulations to argue that by maintaining this fishery, it "actively maintained its titles," and therefore deserved sovereignty. This paper will use the Discovery Investigations to demonstrate the linkage between science and the state in Antarctic geographies, arguing that the primary role of these marine scientists was to improve the status of the British Empire in the Antarctic, through developing stronger knowledge of the hydrography and the marine life and using that knowledge to legitimize their occupation of the Southern Ocean.

If We're All in Antarctica, Who's Driving this Train? Exploring Boundary-work and the Governing of Scientific Infrastructure around Halley Research Station, 1956 –2000

- *Alice Oates*

Halley research station, Antarctica, was established for the International Geophysical Year 1957-58 by the Royal Society and has a scientific mandate including atmospheric science and space weather research. In Halley's 66 years of continuous operation it has regularly functioned as a microcosm of the interaction of science and politics in British Antarctic activity. During the IGY Halley, and the Trans Antarctic Expedition which occurred at the same time, were mobilised by numerous actors in polar science and governance to support various agendas, thereby operating as a boundary object as defined by Star and Griesemer (1989). This paper explores the politics of Antarctic infrastructure performed around Halley at key moments in time: it's establishment as Royal Society Base, the decision to retain the base under the auspices of the Falkland Islands Dependencies Survey beyond the end of the IGY, and transition moments when decisions were made about replacing buried or damaged past versions of Halley.

10 - The Scientization of Central Banks – 2. National Paths of Central Banks Scientization

Room: **AW.1.126**

Organisers: Aurélien Goutsmedt & Francesco Sergi

Chair: Francesco Sergi

Session Abstraction:

In the last decades, central banks have become crucial institutions in the management of many countries' economies. This evolution has been accompanied by a rising 'scientization' of central banks. Scientization could result from the wish to base policy decisions on "science" (mainly, economics); hence it could be understood as the logical consequence of the technical dimension of central banks' interventions (whether regarding their role in terms of monetary policy, or of micro- and macro-regulation and the supervision of the banking and financial system). Notwithstanding this logic, scientization then comes with the risk of making central banks increasingly "apoliticized," "basing their views on (…) the language of science" (Marcussen, 2009), out of reach of the citizens' (and politicians'?) understanding and control. Besides, it is not easy to distinguish the actual reliance of central banks' decision-making on science from the mere reference made to science for reputational and communicational motivations.

Whatever their motives, central banks have also become a major provider and funder of (economic) research; for instance, most macroeconomists publishing in academic journals are affiliated to central banks (Claveau and Dion 2018). This rising engagement of central banks with the production of economic knowledge raises the question of their influence on the content of such knowledge: how does this affect the paths taken by research, or limit the number of contributions criticizing central banks' policy?

We think that the concept of scientization is a valuable concept, as it helps raising relevant questions to study the interplay between central banks' practices and the ideas and tools developed by economists, as well as to think about the role that science can play in the choice, the implementation, and the justification of economic policies:

- How have hiring and promotion patterns changed over the years in central banks? How has this impacted central banks' research practices and/or the policymaking process?
- Which research policies were developed by central banks? How have these research policies reshaped research dynamics in economics (topics, theoretical frameworks, empirical methods)?
- How has economic knowledge been competing with other types of knowledge in central banks (law, finance, management, new quantitative approaches like machine learning, etc.)?
- How has research become a reputational and communicational issue for central banks?
- Did central banks become more reliant on science, when implementing their policies?

Economic Expertise and the International Circulation of Economic Ideas: Debating the Portuguese Central Bank

- *Ana Costa & Gonçalo Marçal*

In the last decades, a growing body of literature has recognized the importance of studying governmental institutions as places of international circulation of economic ideas. This literature acknowledges the influence of economic ideas and discourses in economic policy making. In Portugal, the role of the Department of Economic Studies (DES) of the Portuguese Central Bank, in the interplay between the production of economic knowledge and economic policy advice, remains largely unstudied. This case is

the focus of our study.

Throughout the 1970s and 1980s, DES emerged as a new and influential jurisdiction with an important role in the intellectual trajectory and consolidation of the scientific field of economics in Portugal. A first hypothesis guiding our case study is that the interconnection between the academic, the political and the policy making spheres is crucial to understand the characteristics, the content and the role of the production of economic knowledge by DES. Since the 1970s, this interrelationship has changed and is open to different interpretations by DES's economists. A second hypothesis stems from the recognition that in a semi peripheral country like Portugal the production of economic knowledge by DES is influenced by the emulation of the academic American standards and by a network of collaborations with international organizations. The emulation of the canons of mainstream economics brought the research of the department closer to a more formalistic approach (e.g., real business cycles and stochastic general equilibrium models).

Aiming to contribute to understand how the economic discourse – that becomes dominant – serves to convey meanings, to stabilise interpretations and making forms of political action legitimate while hindering others, the case study combines in-depth interviews (key DES's economists) with content analysis and text mining (Co-Word, Topic Modeling) of the main publications of the Portuguese Central Bank.

The Bank of Italy's Servizio Studi: In-Between Academic and Policy Language

- *Antonella Rancan*

The paper deals with the role played by the Bank of Italy's *Servizio Studi* (research department) in the process of 'scientization' of the bank's language and practices, and investigates whether and how this process influenced both the evolution of the Italian economic discipline, and the policy making decision process outside the Bank. I especially focus on the late 1970s and 1980s when the reputation as a leading research center of the *Servizio Studi* was already well-established. Indeed, while historians' attention mainly concentrated on the origin of the Bank of Italy's *Servizio Studi*, or its role in the postwar reconstruction program and planning policies of the 1950s and 1960s, less attention has been paid on what happened in the late 1970s and early 1980s. The paper focuses on these years, to investigate how the interactions between the *Servizio Studi* research activities with academia and policymakers, evolved. How did economists from the *Servizio Studi* confront with the important transformation of the discipline, such as the shift from Keynesian (and post Keynesian in Italy) economics to monetarism, its internationalization and quantitative turn, as well as with the political power during the stagnation crisis? Was the *Servizio Studi* (long run) reputation and its now well-established ability to manage analytical tools a way to reinforce its political power behind monetary actions, influencing the decision-making process also outside the bank, and driving the policy discourse towards a more rigorous language? Was it able to influence the economic debate and research efforts of academic economists?

Employing Economists: The Bank of England and its First Economic Advisers, 1918–1935

- *Robert Yee*

Today, central banks are pioneers of economic research. This presentation examines the origins of this status, detailing the role and influence of economic advisers at the interwar Bank of England. What made bankers enlist the aid of economists? In response to the fiscal problems brought about by the First World War, coupled with the desires for European monetary reconstruction, the central bank sought to draw on external advisers for their expertise. Initially, economists with statistical training were hired to assist the Bank with its internal research, culminating in the creation of a research division in 1921. Improving reputation and prestige among the central-bank community were important motivating factors, as the

Bank searched for international experts on monetary policy and financial crises. Later, the number of economists increased as they supported the Bank's list of responsibilities beyond monetary affairs and into new areas, such as imperial relations and industrial rationalization. On these matters, the limitations and opportunities of economic expertise in influencing public policy can be critically assessed. Under what circumstances do central banks (willingly or reluctantly) draw on the social sciences? Ultimately, the postwar proliferation of economists, both at the Bank and in international institutions like the International Monetary Fund, built upon the foundation laid by economic advisers in the interwar years.

34 - Small Science

Room: **AY.2.107**

Organiser: Xavier Roqué

Chair: Xavier Roqué

Session Abstract :

The historiography of contemporary science has taken small science for granted. As Big Science was critically examined, no effort was made to investigate the work done by small teams producing first-rate knowledge with modest means. Since the turn of the century, however, an emerging concern for small ways of knowing and doing is noticeable. This symposium on small science aims at placing such recent concerns in historical perspective. As part of a research project in progress, papers in the symposium will examine some of the historical strands converging in current small-scale scientific practices. The paper by Roqué will provide an overview of the actual uses and meanings of "small science" and related terms, such as "slow science" or "frugal science", with a view to characterize small-scale research in a way that it is not dependant on current definitions of Big Science. The paper by Cirac-Claveras will discuss small-scale projects in space science. Focusing on small and tiny satellites orbiting the Earth, she will consider the relation between nano, crowd-funded, commercial private iniatives and large, public-funded governmental agencies, as part of an ongoing ERC Starting Grant on satellite data and climate change. Finally, the paper by Pérez Canals will complement both approaches with a case-study on the role of research groups from peripheral institutions in the genesis of quantum statistics in the interwar years. The paper will shed light on small science theoretical practices before the rise of Big Science. The symposium will probe into research practices whose historical development and significance have been eclipsed by large-scale projects.

Small Science in a Big Way. Satellites, Data and Weather

- Gemma Cirac-Claveras

Satellite technology tends to be portrayed as a prototypical example of Big Science, involving State-funded huge spacecraft, hierarchical centralised management, large industrial contracts and associated gargantual costs -and often it is still embedded within a Cold War era narrative of rivalry. Yet, at this writing there are around 1500 private-owned small satellites orbiting the Earth. More than 130 of those satellites are tiny satellites (size of a Rubik-cube) that collect atmospheric data necessary for producing routine weather forecasts. How can nano, crowd-funded, commercial private satellites challenge governmental meteorological agencies at producing weather data? This paper examines who invested commercially in such form of low-cost satellite data collection for meteorology in the US, with what purposes, what they brought with them, what they did (or failed to do) with it, and how.

This history gives us insight into the peculiarities of weather forecasting using satellite technology, the

institutional and legal structures it required (at national and international scales), the changes it involved and the controversies it generated. It illustrates how meteorological knowledge shifted from scientists to entrepreneurs and, in particular, how legitimacy to produce quality scientific data moved to the private industry. In so doing, this story reveals that, in a field dominated by Big Science historiographical narratives, there is room for accounts involving smaller ventures and that they reflect a much more complex landscape of space science and technology -in particular, one that considers data commercialisation as a central force.

The Peripheral and Theoretical Origins of Quantum Statistics

- Enric Pérez Canals

The origins of Quantum Statistics (1924-1926) leads us to two places, which rarely appear in the history of modern physics: India and Italy. From there came two of the contributions that unraveled some of the debates that had been taking place in Europe on the quantum theory of ideal gases. Their authors are Satyendra Nath Bose (Calcuta) and Enrico Fermi (Roma). Both contributions had in common that they did not require neither experimental expertise nor well-equipped laboratories. Rather, they consisted of theoretical developments that inaugurated new ways of posing old problems, formulated from the knowledge (not always exhaustive) of current physics. We will discuss how it was the conjunction of these contributions with their reading and interpretation by physicists working in the nerve institutions of physics of the moment, such as Einstein (Berlin), Dirac (Cambridge), and Heisenberg (Göttingen), which gave rise to quantum statistics. We will take advantage of this case study to discuss how quantum statistics offers a very good example of tension in the scientific discourse in classrooms, outreach and specialists. For this, we will tackle the concept of indistinguishable particle and its role in modern quantum physics

The Meanings of Small Science

- Xavier Roqué

This paper deals with the uses and meanings of the term “small science” and related terms, such as “little science”, as deployed in two leading general scientific journals, Nature and Science. The use of such terms increased, rather than decreased, since the end of WWII, along with the introduction of the term “Big Science” and the extension of large-scale scientific practices.

I will analyse the disciplinary context of use, the changes in time, and the various meanings attached to these key terms. I will also trace and consider the relation with more recent terms, such as “slow science” (Stengers, 2011), “frugal science” (Cybulski, 2015), “thrifty science” (Werrett, 2019), and “ruination science” (Ureta, 2021). As part of an ongoing investigation on contemporary small-scale scientific research, my aim is to provide a map of the actual deployment of such terms and to avoid looking at these research practices through the lenses of large scientific operations.

45 - Boundings and Unboundings in the Sciences: Gender, Experimentation, and Authority – 3
Women's paths to authority

Room: **H.2.215**

Organisers: María Jesús Santesmases & Andrea Núñez Casal

Chair: Donald Opitz

Session Abstract:

Over the past three centuries, experimental scientific research cultures have been performed in a variety of settings, methods, and means, inventing and modifying technical devices, experiments, and knowledge production. In modern western science, women participated in working spaces, its temporalities, and modes of work in laboratories as well as in other informal and experimental settings of scientific practice. In this context, few women developed an authority of their own while many were regarded as helpers, assistants, or technicians, mostly of men.

STS and historical studies on women and gender belongs to a ubiquitous politics of science that established and consolidated some knowledges and practices as scientific and others as routines; some spaces as domestic and informal (i.e., homes), others as professional and formal (i.e., the university, the industry). The orderings of experimental work and its dissemination established gendered hierarchies of laboratory work at the intersections between spaces of scientific authority in the academia and the industry and the private spaces of the home.

This panel explores how boundaries, how the scientific ¨orderings¨ of labours, settings, and genders were produced and reproduced over the past centuries in experimental scientific research. This set of contributions shows the interplays between articulations of scientific truths and the experiential politics of knowing, between the official authority of science and the exclusionary practices of ordering genders, spaces, and temporalities. We analyse, within and beyond western science, historiographies of inclusive forms of scientific collaborations and interdisciplinary work, their situated knowledge-practices, gendered cultures, and materials that resisted the status quo of scientific authority.

Gender and the Sources for a Story on Microbials and Antimicrobials in an Industrial Research Laboratory

- *María Jesús Santesmases*

Remembrances of a woman scientists who worked at an industrial research laboratory are a rich source for reconstructing the history of antimicrobials detected in bacteria and fungi. Some texts by directors of research programs of the same lab have been published but is in her published records where practical details on the social life of bacteria and fungi are found, in which the circulation of samples that give agency to her work and her colleagues' in Madrid and in Rahway (New Jersey, US) combined with giving recognition to bosses.

Texts written by Sagrario Mochales and by other scientists who worked at Merck Research laboratories in Rahway and Madrid during the 1970s and 1980s allows to present a historisation of the transition from bacteria to fungi. Those sources on the search for new antimicrobials were one of the paths through which fungi, antifungal products and new drugs for treating disorders related to cholesterol levels were investigated. Her testimony of a "personal scientist-microorganism relationship", included in her remembrances, blurred the boundaries of the work done by directors and technicians, by giving to them all the treatment as scientists, as science graduates who did research in an industrial laboratory by using

sometimes academic habits regarding publication in search for academic recognition beyond industrial profits.

Betalactamases in the Clinical Microbiology Lab: Clara Roy and Antimicrobial Resistance in Barcelona during the 1980s

- Cristina Moreno

In this paper, I analyse the research published from a microbiology laboratory of a university hospital in the 1980s, a crucial gendered and hierarchical site of knowledge-production. I put a focus on the work of Dr Clara Roy, a woman physician-microbiologist who dedicated the majority of her career to researching the mechanism of bacterial resistance caused by the family of enzymes known as beta-lactamases, at the microbiology lab service of the Hospital del Mar in Barcelona, Spain, from the 60s until her passing in 1993. Here, I focus on Roy's scientific production during the 1980s, the most productive decade of her career. At the time, she led a team of clinical microbiologist-researchers –several of whom were women too– that, whilst providing clinical services to hospital patients, also published research on epidemiological evidence and key technical laboratory practices of lasting influence in Spanish clinical microbiology, particularly on the diagnosis of infections caused by microorganisms that produce betalactamases. Whilst there is evidence that many women worked in hospital microbiology laboratories in Spain in the second half of the 20th century, their work was not usually published and first-authored, whilst microbiology lab services remained chaired by male physician-microbiologists. The research published by Roy and her women colleagues on betalactamases provides a historiography counter to the norm that allows for an analysis of the gendered labour of the microbiology laboratory and particularly that concerned with clinical research on antimicrobial resistance.

Games and Genes: Human Diversity meets Cytogenetics, Mexico 1968

- Ana Barahona

In *Sex Testing. Gender Policing in Women´s Sport*, Lindsay Pieper explores sex testing for female athletes from the 1930s to the early 2000s to examine how the International Olympic Committee's (IOC) policy privileged Western norms of gender to stress the idea that sporting prowess contradicts femininity. Originally conceived to guarantee the authenticity of female athletes, the authorities' narrative changed to encapsulate gender normativity, using sex testing/gender verification as a tool to eliminate competitors whom it deemed too strong or unfeminine. Since the 1930s, there were visual examinations, but as human biology developed, the committee used chromosomes and genetics to determine the athletes' sex. The first-time cytogenetic techniques were applied to athletes was in the 1966 European Championship in Budapest. As they resulted useful, the IOC embraced them to Olympic athletes for the first time in 1968 in Mexico. The Genetics and Human Biology Program (GHBP) was created in 1966 to study the genetic and anthropological components that determine an Olympic athlete's abilities and determine the sex of women athletes. This investigation studied 1,265 game participants and included family studies, cytological analyses, research on single genes, and the study of sex determination. This talk intends to show how GHBP´s work fits in the larger tapestry of post-1945 human biological studies, to explore how the Olympic athlete population studied can be considered laboratories of knowledge production or sites of cognition, and finally, how gender was used to account for persisting inequalities as well as radically different social experiences between women and men.

69 - Computing Politics in late 20th and early 21st Century - 3

Room: **AW.1.120**

Organisers: Arianna Borrelli & Liesbeth De Mol

Chair: Barbara Hof

Session Abstract:

This Symposium offers a historical contextualization of the increasingly pervading use of computing in practically all areas of human endeavour. These developments are both shaped by political factors and have political implications whose breadth and depth are only recently being appreciated. A good example is "artificial intelligence", which has been hailed as a solution to long-standing problems, or denounced as a potential tool of discrimination. In political debates the historical dimension is often oversimplified, if not fully absent, and with this Symposium we wish to showcase research results by scholars investigating the history of these topics - scholars who come both from history and from other disciplines.

The contributions look both at the background and agendas of the historical actors developing and using computational tools in different contexts and at the technical features of the tools themselves, which could in turn at least partially shape both aims and conceptual frameworks of their users. We believe this and similar research can contribute to political discussions and open up new avenues of reflection, and wish to bring it to the attention of the broader community of historians of science and technology, where it has so far not been very present.

The Symposium has three parts. The first one presents examples of how specific computing methods and tools could become the shared core prompting the emergence of new communities. The other two parts focus on the history and politics of what is today usually referred to as "artificial intelligence," a term now comprising not only logical-mathematical formalization of thought processes, but also - and indeed primarily - methods like machine learning. A commentary and general discussion conclude the Symposium, which is organized by the Interdivisional Commission on History and Philosophy of Computing (HaPoC hapoc.org) of the Division of the History of Science and Technology and the Division of Logic, Methodology and Philosophy of Science and Technology.

"Computational Reproducibility": Origins and Contradictions

- Arianna Borrelli

In 1992 geophysicists John Claerbout and Martin Karrenbach published a paper which is today often quoted as marking the beginning of the "reproducibility crisis" - a crisis whose definition, causes and possible solutions have been a major issue in science policy of the last decades. However, far from declaring a crisis, Claerbout and Karrenbach in 1992 welcomed "word processing and software command scripts" as providing the chance of improving reproducibility in computationally-aided science. By the beginning of the 21st century, though, Claerbout and his collaborators were less optimistic in assessing the situation of "reproducible research" (Claebout et al. 2000) and s decade later, it was recognized that the use of computational methods could actually introduce new sources of non-reproducibility (Stodden 2013).

Nonetheless, since the turn of the millennium the notion of "computational reproducibility" emerged and eventually established itself as minimal reproducibility requirement for scientific research. The 2019 Report on Reproducibility and Replicability in Science of the U.S. American National Academies of Science, Engineering and Medicine states: "Reproducibility is obtaining consistent results using the same input data, computational steps, methods, code, and conditions of analysis. This definition is synonymous with 'computational reproducibility,' " Computational reproducibility is regarded as in principle possible and even necessary, although some philosophers of science argued that it contrasts with the practice of science. This paper constitutes a first attempt in reconstructing the historical constellation from which

computational reproducibility emerged, with the aim of contributing to historicize some aspects of the "reproducibility crisis".

Comment: Liesbeth De Mol

73 - Counter-Knowledge – 3. Epistemic Tensions
Room: **AW.1.125**

Organiser: Alexander von Schwerin

Chair: Alexander von Schwerin

Session Abstract:
Counter-knowledge–or critical knowledge–has long been at the heart of activism within academia and beyond. Alternative movements have produced critical and alternative forms of knowledge, most prominently in the so-called New social movements of the 1960s and following decades, e. g. the environmental and anti-nuclear (protest) movements. Also, different strands within the countercultural movement tried new forms of life together including their theoretical, practical and technical bases, e. g. housing, energy production, agriculture, child care.
This series of three symposia seeks to elaborate further on the process and forms of knowledge production at the intersection between academia and the New social movements. The term counter-knowledge suggests a close relationship between on the one hand established science and technology and, on the other hand, alternative viewpoints/accounts critical of the mainstream position. This relationship seemed to be a main feature in the history of counter-knowledge, though it has been challenged constantly by esoteric forms of knowledge including conspiracy theories, quack medicine, and fake science. The aim is to foster and discuss historical studies that explore and bring forth new insights into the historical conditions in which counter-knowledge flourished, the form that it took and its effects.
In symposium I, we focus on forms and practices of counter-knowledge.
In symposium II, we focus more counter-knowledge in context.
In symposium III, we explore the epistemic tension within the realm of counter-knowledge.

Looking beyond Western Biomedicine: The Journal Curare in West Germany
- Lisa Schmidt-Herzog & Cornelius Borck
In 1978, a “journal for ethnomedicine and transcultural psychiatry” started in West Germany, blending in its title *Curare* the Latin for “to cure” with the poison used by indigenous people in South America. By its self-made design, the new journal affiliated itself with the counterculture – rightly so, as it aspired to question the dominance of biomedicine in health and healing issues. An invited opening editorial explained: “A journal of ethnomedicine and transcultural psychiatry today meets an urgent scientific need, namely, the recognition that we must not take our scientific generalizations about human nature, human culture, and human society only from our own ‘ethnocentric’ biased horizon.” Such a mission may seem obvious from today’s perspective, but the journal exhibits a more convoluted approach, making it a rich case for the historical analysis of counter knowledge. In fact, the journal situated itself “in between” academia and social movements, combining, for example, contributions from established academics with travel reports by young practitioners. Following the journal through its first two decades, the presentation questions how *Curare* focused on non-Western practices rather than critiquing biomedicine: How did its formats of writing and printing correspond with its conceptualization of counter knowledge? Did the

journal stipulate a specific epistemic agenda? Perhaps *Curare* exhibits counter knowledge in a surprisingly comprehensive, and yet ambivalent, sense of the word, i.e. neither purely theoretical nor directly critical, but esoteric and reflexive. Driven by the curiosity for the "exotic", the journal countered established knowledge by offering unsettled alternatives.

Between Science and Anti-science? Counter-universities since the 1960s

- Susanne Schregel

During the last fifty years, activists from various movements have criticized scientific expertise and academic institutions; at the same time, they have experimented with alternative forms and spaces of knowledge production. Gaining prominence with "free" and "critical" universities and colleges in the US and Western Europe, the declaration of "alternative" places of learning and research has been a key feature of such interactions between movement activism and academia since the 1960s. To understand the general trends as well as specificities that characterize such attempts at the intersection of "science" and "critical science", the suggested presentation diachronically compares "alternative" colleges and universities in West Germany from the 1960s to the present. In particular, it focuses on the "critical" and "free" universities organized by the student movements in the 1960s and 1970s; the *Free International University* for creativity and interdisciplinary research (late 1960s to 1980s); the "women's universities" (late 1970s and early 1980s); the "free people's university" near Frankfurt am Main airport (1981ff.); the *Silent University* (a "solidarity based knowledge exchange platform by displaced people and forced migrants", late 2000); *Occupy University* (2011ff.); and places of learning and research in *Fridays for Future* (2019ff.).

Naturalism and the Fight against Counter-Knowledge: The American Skeptics Movement in a Global Context

- Stephen P. Weldon

In 1976, a group of academics, magicians, entertainers, and scientists met at an annual conference of the secularist American Humanist Association group to discuss a threat to modern civilization, namely the rise of anti-Enlightenment (counter knowledge) movements. They were especially concerned that irrationalism in popular counterculture movements was infiltrating into the academy. The conference resulted in the formation of a group of self-described skeptics who sought to defend the academy against "incursions" by forces of superstition, ignorance, and mysticism. The threats came from various sources: Christian fundamentalism, New Age beliefs, and anti-positivism within the academy. This skeptics movement flourished in both popular culture and in the academy, and it came to have global reach. This movement had, for example, close ties to a much older Belgian group of paranormal skeptics, Comité Para, and would spawn affiliates across the globe, from Ecuador to India to Japan.

Drawing on various sources (archival research, humanist and skeptic publications, and interviews), this paper will consider the philosophical, cultural, and institutional elements that gave rise to the skeptics movement and explore intersections between the American movement and the rest of the world. It will focus on the central role that philosophical naturalism and scientific thinking played in the conflict between the counter knowledge producers (who often associated modern scientific institutions with mechanistic and anti-humanistic ideas) and the skeptics (who embraced science, naturalism, and rationality as a means to defend humanism).

90 – Early Modern Britain

Room: **AW.1.121**

Chair: Steffen Ducheyne

Deciphering Isaac Newton's 'Regulae Philosophandi' and the 'Queries': A Comparative Study

- Frederik Dhondt

Ever since their inception in the first edition of the *Philosophiae naturalis principia mathematica*, Isaac Newton's *regulae philosophandi*, called 'hypotheses' in the first edition, have puzzled readers. Both their content and the context out of which they arose were and are heavily debated amongst contemporaries of Newton's as well as present-day historians and philosophers. The reasons for the opaqueness of the *regulae* are the fact that they were only published in Latin by Newton, that they contain methodological material that Newton only sporadically made public and that they are notoriously short and dense.

In this paper I show that the *regulae* have thematic affinities with the Queries to the Opticks/*Optice*. By exploring the relationship between the methodological sections of these texts and their respective drafts, I aim to clarify the meaning of the *regulae*. In order to accomplish this, I will first assess the nature of the affinities between the two texts by asking the following question: do the *regulae* and the Queries have a common editorial history or are they merely thematically related? If the former is the case, then we can research explicit overlaps between the two texts and/or their draft material. If the latter, then affinities between the two works are more tentative, but nonetheless valuable—as I will try to show.

Once the nature of the affinities is assessed, I use the Queries and its drafts to analyse the notoriously opaque *regulae*.

Newton and the Ancients, or, How I learned to Stop Worrying and love Hermes Trismegistus

- Cornelis J. Schilt

Early modern knowledge-making different significantly from its modern counterpart. Natural philosophers such as Nicolaus Copernicus, Francis Bacon and Isaac Newton firmly believed in a form of ancient wisdom, known in its various guises as *prisca sapientia*, *prisca scientia*, *prisca theologia* or *philosophia perennis*, which involved an intimate knowledge of the cosmos. That knowledge originated with Adam and the patriarchs, passed on to legendary figures such as Zoroaster and Hermes Trismegistus, in a line of sages that also included Thales of Miletus and Plato. During the Italian Renaissance, scholars like Georgios Gemistos Plethon, Marsilio Ficino, and Augusto Steuco became responsible for the translation and hence rediscovery in the West of key writings such as the Corpus Hermeticum and the Chaldean Oracles, attributed to Zoroaster, writings which purportedly contained factual truths about God, mankind, and the cosmos. Interestingly enough, despite the debunking of the Hermetic writings as early Christian frauds by Isaac Casaubon in 1614, the popularity of these and related ancient wisdom writings remained. Even a century after, Gotfried Wilhelm Leibniz still believed that they might contain grains of truth. Very little research has been done into the influence of the idea of an ancient wisdom on the foundations of modern science. In this paper, I will focus on one key proponent of this tradition, Isaac Newton. I will argue that in order to fully understand Newton's science, we have to look beyond the disciplines traditionally defined as such, and pay close attention to his studies of ancient history and mythology.

The Vital Material of Moral Virtue in Francis Bacon's Natural Philosophy

- H. Glen Taylor

The investigation into and interpretation of nature as prescribed by Francis Bacon (1561–1626) must be undertaken only by the practitioner who has effected the self-disciplined husbandry of their own moral virtue as integral adjunct to their experimental methodology. In the Baconian model of progression wherein experiment/observation leads to interpretation/transmission, individual moral virtue, or what

Bacon calls *active Self-good*, serves as the self-disciplinary fulcrum upon which the human tools of sense and intellect operate in a closed, conversational equilibrium. Bacon contends that it is only from such a source that new knowledge can be effectively transmitted to posterity as a useful and beneficent contribution to the collective good, or what Bacon calls the *Good of Communion*. Bacon warns that the human mind is wont to accommodate that which agrees with its anticipations rather than submit itself to the humbling task of interpretation. The cultivation of one's moral virtue prepares the lone enquirer to prevail through the inevitable agony of uncertainty which attends the activity of investigation. Bacon thus accounts for a human mind which, though sincerely dedicated to the acquisition of natural truths, becomes powerless to its own desperation for success. Bacon's *active Self-good* is possessed of a material ontology. It embodies *artificial* material processes within both the human anima and intellect which correspond to the *intrinsic* material processes that inhabit the natural world. The paper explores the ontology of Bacon's individual moral virtue and why he considers it crucial to the enquirer's experimental and interpretive interaction with nature.

124 - History of Higher Education Policy and Patents
Room: **AY.2.108**

Chair: Denis Diagre-Vanderpelen

Tallinn University of Technology: A Centre of Knowledge in the Periphery
- Peeter Müürsepp
The official beginning of technical education in Tallinn was the start of special courses in technical disciplines on 17 September 1918 when Estonia was still under German occupation. These courses were developed into a university by 1936. In the pre-WWII period there was a debate whether technical education in Estonia should be moved to Tartu. In the end, it was still decided that the place to develop technical education and science is Tallinn. For the most of the Soviet era the university was called Tallinn Polytechnic Institute. The university was growing and developing steadily throughout the Soviet period. In 1989, the name Tallinn University of Technology (TUT) was reintroduced and modelling the study programmes on the basis of the Western tradition began. Massachusetts Institute of Technology was taken as the model for TUT. In 2008 an international private university specialising in social sciences, was merged with TUT. By this move, TUT obtained its Law School. Several curricula taught in English came over, together with a large body of international students. Another important recent development is the change in strategy concerning picking the model to follow. Scandinavian universities of technology have been made exemplary to TalTech. The role of scientific research has been growing throughout the history of the university. First, it was predominantly oil shale studies. Today it is very much more, including high level business and governance studies, Information Communication Technology and natural science in addition to engineering. TalTech is a member of the EuroTec network.

Security Issues and Research Application in Interwar Czechoslovakia: A Case Study of Patent and Trademark Disputes
- Tomáš Gecko
The paper aims to understand the relationship between security issues and the effectiveness of research application in interwar Czechoslovakia. The topic will be outlined through an analysis of legal cases heard before the Czechoslovak Patent Court that had domestic and international implications and influenced debates on the security of the Czechoslovak technological base. The topic will be interpreted in the context of the images of science. The paper is based on the hypothesis that the issue of security and openness is a unique image of science closely linked to the ideological context not only of the 21st century, but especially of the interwar period. Patent and trademark protection is one of the tools to ensure the security in the implementation of scientific knowledge into practice. The presentation draws on archival sources from government agencies and business companies, as well as printed sources, to reflect interwar debates on issues of security and openness in the development of science and research.

Conflicting Views on University Governance: A Belgian Case Study (1971-2003)
- Alexia Coussement
The past half-century has been a turbulent time for universities in Western Europe. National governments have adapted their university legislation in response to societal changes (e.g., economic conjunctions, the rise of the knowledge society, European unification). As a result, from the 1960s onwards, universities grew in number and size. Next, they became more democratic, bureaucratic, market-oriented, et cetera. These recent developments are primarily studied by **social scientists**, who pay limited attention to **the experiences of individual universities**. This paper elaborates on the possible **consequences of conflicting**

views and interests of universities and governments regarding university governance.
To this end, the paper analyzes a case study: the **Antwerp** university system. The city can be regarded as a micro-version of the pillarized Belgian academic landscape since it accommodated three legally and ideologically different university institutions (UFSIA, RUCA, UIA) between 1971 and 2003. Through a close reading of primary sources such as **newspaper articles** (*Gazet van Antwerpen),* **university press** (*Universiteit Antwerpen*), and various sources from the Antwerp **university archive** (e.g., meeting reports), this paper will demonstrate the struggle of university boards to aspire their policy stances when the Belgian/Flemish government pursued an incompatible higher education and science strategy.
By focusing on Antwerp, this study fills a gap in the research on Belgian university history. Additionally, it questions the practice of conforming universities to a rigid legal framework, which can hold them back from creating their own institutional identity and reaching their full potential.

18:15-19.30 -*Business History Chair Round Table*

150 - From Life Sciences to Healthcare Provision: Lessons from Past and Present Experience
(Business History Chair Round Table)
Room: **K (auditorium La Fontaine)**

Guest speakers:
- Victor G. Rodwin, Professor Emeritus of Health Policy and Management, Wagner School, New York University
- Reinhilde Veugelers, Professor at KU Leuven, Senior Fellow at Bruegel and at the Peterson Institute for International Economics

Will be in conversation with Mathias Dewatripont (Université libre de Bruxelles)

19:30-20:30 - *Business History Reception*

Room: **Hall of K (near the auditorium La Fontaine)**

Friday 9

09:00-10:30 – Sessions

11 - The Scientization of Central Banks – 3. The Politics of Scientization

Room: **AW.1.126**

Organisers: Aurélien Goutsmedt & Francesco Sergi

Chair: Morgane Delorme

Session Abstracts:

In the last decades, central banks have become crucial institutions in the management of many countries' economies. This evolution has been accompanied by a rising 'scientization' of central banks. Scientization could result from the wish to base policy decisions on "science" (mainly, economics); hence it could be understood as the logical consequence of the technical dimension of central banks' interventions (whether regarding their role in terms of monetary policy, or of micro- and macro-regulation and the supervision of the banking and financial system). Notwithstanding this logic, scientization then comes with the risk of making central banks increasingly "apoliticized," "basing their views on (…) the language of science" (Marcussen, 2009), out of reach of the citizens' (and politicians'?) understanding and control. Besides, it is not easy to distinguish the actual reliance of central banks' decision-making on science from the mere reference made to science for reputational and communicational motivations.

Whatever their motives, central banks have also become a major provider and funder of (economic) research; for instance, most macroeconomists publishing in academic journals are affiliated to central banks (Claveau and Dion 2018). This rising engagement of central banks with the production of economic knowledge raises the question of their influence on the content of such knowledge: how does this affect the paths taken by research, or limit the number of contributions criticizing central banks' policy?

We think that the concept of scientization is a valuable concept, as it helps raising relevant questions to study the interplay between central banks' practices and the ideas and tools developed by economists, as well as to think about the role that science can play in the choice, the implementation, and the justification of economic policies:

- How have hiring and promotion patterns changed over the years in central banks? How has this impacted central banks' research practices and/or the policymaking process?
- Which research policies were developed by central banks? How have these research policies reshaped research dynamics in economics (topics, theoretical frameworks, empirical methods)?
- How has economic knowledge been competing with other types of knowledge in central banks (law, finance, management, new quantitative approaches like machine learning, etc.)?
- How has research become a reputational and communicational issue for central banks?
- Did central banks become more reliant on science, when implementing their policies?

The Multiple Paths of Scientization at the Bank of England

- *Béatrice Cherrier, Aurélien Goutsmedt, Francesco Sergi & Clément Fontan*

According to Marcussen (2009), central banks would have entered in the 1990s in a "fifth age" that he calls the age of "scientisation". In this contribution, we study the history of research at the Bank of England and which forms scientisation have taken there. Indeed, scientisation unveils different types of dynamics, and thus depending on these dynamics, different timings. Scientisation can designate: 1) the increasing

role of economists within central banks, with the hiring of economists in the staff or with economists accessing executive positions. We can observe the emergence of this process in the 1970s and its acceleration in the 1980s within the Bank; 2) the development of research and the increase of publications by central bank staff in peer-reviewed journals. After a brief episode in the late 1980s, it became a central activity at the Bank only in the 2000s and mainly after the great financial crisis; 3) the use, in the Bank's analysis, policy, and communication routines, of conceptual devices coming from the economic discipline, like forecasting models. Here, the 1990s have been crucial in transforming the practices of the Bank; 4) the emphasis on science/economics puts by central bankers in their communication about the policies implemented. A phenomenon that has remained minor within the Bank. We argue that the occurrence of these different dynamics at different periods in the Bank's history is the result of a changing trade-off between the necessity to appear at the cutting-edge of science and attract skilled economists on one hand, and the necessity to produce analyses and devices directly and concretely useful for policy decisions.

Central Bank Economists and the Impact of the Financial Crisis on the Academic Economic Discourse
- *Matthias Thiemann & Stefan Priester*

This paper investigates how the academic economic discourse on financial markets and their possible impacts on the real economy has changed since the great financial crisis of 2008. Based on a dataset of 69251 economic articles published in the 37 top academic journals on the topic of finance and the macro-economy since 1990, it performs topic modeling and both a static and dynamic bibliographic coupling analysis to show that while no clusters of papers problematizing finance can be identified pre-crisis, post-crisis a critical macro-financial view on financial markets has taken hold in academia. This view problematizes the nature of financial markets as instable and subject to boom-and-bust cycles, in turn generating negative spill-over effects for the economy. Based on web-scraped and hand-coded CV data of the authors in this identified cluster, we show that economists in central banks and academics affiliated with these institutions have played a central role in the establishment of this cluster, these applied economists shifting the discourse of the entire profession on this topic.

Discussion

41 - Who Are the Social Scientists? Profiles, Strategies and Circulations of Actors of a Knowledge in the Making (1870-1940)

Room: **AW.1.121**

Organisers: Marie Linos & Margot Elmer

Chair: Kaat Wils

Session Abstract:

If history of science has taught us a single lesson these past thirty years, it would certainly be that science is a deeply social activity. Moving away from a conception of science as something “floating free in the air”, historians have emphasized the social structures shaping institutions of knowledge as well as the central agency of the scientists, these men and women behind the curtails of scientific practices. However, whereas the figures of the natural scientist have attracted much attention, the historiography has merely approached the diversity of profiles of social scientists. By asking “who are the social scientists?”, our

proposal wishes to address this gap and study the social sciences through the protagonists' lens. More precisely, it intends to shed light on how social scientists build their persona in a science still in the making. During the second half of the 19th c. and the first half of 20th c., institutionalization of social sciences was indeed at an early stage, trying to claim a competitive scientific territory both in academia and society in general. Our purpose is to offer a new perspective on these actors' difficult journey towards scientific legitimacy, illustrated by the several strategies they used such as going abroad or creating new tools (diplomas, magazines, institutions) to defend their work. In staging our papers in various timeframes and geographical spaces, from Europe to the United States, we want to show that an embodied perspective of science reveals a large diversity of profiles, often marginalized people within the academic frame, and therefore allows a better characterization of the history of social sciences as a non-linear and grounded process. In summary, if social scientists investigate society, a study of their individual agenda interrogates furthermore the entanglements between science, academia, and society.

The Université Nouvelle de Bruxelles, a Shelter for Progressist Sociologists across Europe: Portraits, Trajectories and Diplomas of a New Kind of Intellectual (1894-1919)

- *Margot Elmer*

At the turn of the 20th c., sociology still faced a great deal of defiance from European universities that only very timidly integrated the new discipline into their programs. For some sociologists, this defiance was moreover doubled with a rejection of their political socialist convictions. In order to overcome these difficulties, the *Université Nouvelle de Bruxelles* was created in 1894 by Belgian sociologists, inclined towards positivism and socialism, who could not secure a stable position within the academic landscape. However, the new university, which offered an innovative social sciences higher education, struggled to convince Belgian authorities of its value and legitimacy. Marginalized on the national ground, the institution underwent an international turn and sought allies abroad, to recruit both professors and students. In analyzing the international (sometimes soon-to-be) social scientists who took part in this original project, this paper aims to interrogate their profiles and individual trajectories, in the margins of scientific establishment and shed light on the difficult process of legitimization of sociology and social sciences. On the one hand, who were the professors and which career path led them to the Université Nouvelle. On the other hand, who were the students, often from Eastern Europe, that wanted to become "doctor in social sciences", a brand-new diploma created by the *Université Nouvelle*. Against the backdrop of the institutionalization of social sciences in its infancy and through the protagonists' lens, this paper wants to highlight the new diversity of actors that accessed universities during the Belle Époque.

Social Sciences: A Matter for Lawyers? The Institutionalization of an Emerging Scientific Discipline in Belgian Universities (1870-1914)

- *Maxime Jottrand*

The institutionalization of social sciences in Belgium was deeply connected to the development of law faculties. Initially, these had the task to train future legal practitioners but also statesmen. For this purpose, specific courses about the organization of the institutions of the country were established. For example, a degree of Doctor in Political and Administrative Sciences was created but abolished in 1876. At least until the last three decades of the 19th c., whereas the concern to develop scientific and academic knowledge about society emerged, Belgian law faculties only offered an education oriented towards civil and roman laws. Therefore, many jurists traveled, with government grants, across Europe to complete their training in social sciences, becoming one of the main reasons for study trips by young Belgian lawyers. Taking up on their experience abroad, some of these jurists argued that social sciences should

be developed in Belgian universities, with the creation of new academic degrees. This reveals the ambivalent position of social sciences in legal education and questions their place in the field of legal knowledge: should social science teachings take place in the law faculties or outside? This debate emerged also in other European countries at the same time, such as France and Germany. By analyzing the profiles and experiences of students who traveled to foreign universities, this presentation aims at exploring the processes of legitimization and institutionalization of social sciences, that took roots in the scientists' transnational practices, in Belgian universities at the turn of the 20 th c.

"Birds of a Feather Flock Together": Partners in Life and Work in early 20th- c. American Social Science

- *Marie Linos*

"Birds of feather flock together" is a popular idiom that seems to exist in many languages. Its popularity is certainly due to its accuracy in describing social realities and especially intimate relationships. In that matter, social scientists are no exception, and this trend is not new: in the United States, the beginning of the 20th c., when women began to become a wider academic audience, constitutes a key period in this regard. Focusing on the case of American social scientists' couples not only provides an historical perspective to a widely observed contemporary phenomenon, but also questions the persona-building of scientific figures. By interrogating the entanglement of the public and private lives, this paper intends to shed some light on how scientists constructed their scientific careers. More precisely, it aims at investigating how partners cooperated to fulfil their scientific and personal ambitions. On the one hand, it looks at strategies developed by women to exist in a patriarchal academia; on the other, this couple's perspective allows us to cast a fresh eye on collaboration in (social) science, examining how partners in life also became partners in their work. This paper will draw upon examples of American social scientists' couples during the first half of the 20th c., navigating through several case studies, but will also be guided by an effort to replace individuals in a broader intellectual and social environment, therefore propounding a history of social sciences through the actors' lens.

75 - Politics and the Public Sphere in Recent German Science: The Case of the Max Planck Society - 1

Room: **AW.1.120**

Organiser: Mitchell G. Ash

Chair: Carsten Reinhardt

Session Abstract:

The Max Planck Society (MPS), founded in 1948 as the legal successor to the Kaiser Wilhelm Society, is today the leading organization for top-level research in Germany, funded in equal shares by the Federal government and the German *Länder*. In order to establish and maintain this strong position in the German research system, the Society's leadership and the heads of its institutes (MPIs) engaged actively with political authorities, as well as the media. The interdisciplinary research program „History of the Max Planck Society" has been investigating these developments since 2015, with the aim of uniting history of science and contemporary German history. The proposed Symposium presents a selection of results from this large-scale project, now nearing completion, in two parts.

Symposium 1 addresses the political aspect of this topic, including the financing of the MPS (Jaromír

Balcar), the role of the MPS in science diplomacy (Carola Sachse), and the role of the MPS in the process of German unification (Mitchell Ash).
Symposium 2 addresses the role of the MPS in the public sphere, focusing in particular on the conflict of the MPS with the Scientology movement over the role of Kaiser Wilhelm Society scientists in the Nazi-era „euthanasia" program (Florian Schmaltz) and the decades-long confrontation with the animal welfare and animal rights movements (Juliane Scholtz). The Symposium will end with a commentary from John Krige, an expert on the history of science and technology during and following the Cold War.

Introductory Remarks on the Project "History of the Max Planck Society"
-Carsten Reinhardt

Science For and Against Diplomacy. The Max Planck Society's Role in West German Foreign Policy – Soviet Union and China in Comparison (1955-1995)
- Carola Sachse
The interaction of science and diplomacy during the Cold War has recently attracted greater attention from historians of science. The MPS, however, was initially uninterested in renewed international activity, after the highly problematic involvement of its predecessor, the Kaiser Wilhelm Society, in the expansionist and destructive politics of Nazi Germany. In the view of the MPS, universally valid basic science should float freely beyond national boundaries, and domestic and foreign colleages should cooperate despite all political differences. Government foreign policy should work at most as Diplomacy for Science, meaning always then, when it might help to overcome political obstacles to communication and mobility across borders. In reality the MPS found itself during the Cold War particularly in relation to the two main political and ideological opponents of the West. In the case of the Soviet Union, the MPS was repeatedly prevented by its government's foreign policy from maintaining highly attractive cooperative relationships, some of which reached far back into the past, while others were of more recent date. Continuing these relationships required skilfull manuevering under the political radar of both governments. In the case of China, on the other hand, the MPS was pressed by the foreign policy of the Federal Republic of Germany into the roles of diplomatic door-opener for West German business and of development aid provider for Chinese science – a decades-long dual role, in which the MPS made itself fit for the globalized science of the 21st century.

The Max-Planck-Society in the Process of German Unification 1989-2003
- Mitchell G. Ash
This paper analyses the role of the Max-Planck-Society (MPS) in the process of German unification. The argument is that in this case science and politics were resources for one another. The thesis is elaboarated in four steps: (1) By opposing any „convergence" of the two science systems in 1990, MPS leadership helped assure that unification in science policy meant extension of the West German status quo to the former German Democratic Republic. In this context MPS President Hans F. Zacher allegedly claimed that East German science was a „desert". (2) Beginning in July 1990 the MPS expanded into the new German Länder with various time-limited initiatives. In 1992 it began to establish new Max-Planck-Institutes (MPIs); by 1998 there were 18 new MPIs, an expansion unprecedented in MPS history. (3) Because high priority was given to reconstruction in the East, political support was provided. Indeed, after an East German became Federal Minister for Science and Technology in 1993, pressure was exerted on the MPS to move more quickly, (4) However, this resource exchange had a cost -- deep funding cuts in the West.

Yet MPS leaders utilized even this situation to advantage, securing a previously unknown level of budgeting flexibility in exchange for closing MPIs in the West. The MPS grasped German unification as a unique opportunty; with its engagement in Estern Germany it achieved unprecedented growth, new research foci and reformed governance structures. By 2003, it had become a different institution than it had been in 1989.
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Discussion

93 - History of Modern Physics - 1
Room: **AY.2.107**

Chair: Jip Van Besouw

Einstein's General Relativity Theory Reconsidered
- Henk Kubbinga
Einstein's celebrated generalization of Relativity Theory (1911, 1915) has been regularly asphyxiated in hagiography, most recently on the occasion of the centenary of its 'confirmation' in 1919 (*). The issue in the years 1911-1919 was threefold: 1. The deflection of a light ray from a star skimming the surface of the Sun on its way to the Earth; 2. The motion of the perihelium of Mercury; 3. the red shift of light from the Sun as received on Earth compared to white light produced on Earth. The 'confirmation' proper of 1919 concerned only issue № 1, the deflection of the light ray expected to be big enough to be measurable during the solar eclipse of May 29 of that year. The UK-astronomers mounted two expeditions, the one to Sobral in Brazil, the other to the isle of Principe, off the coast of West-Africa. I would like to discuss the technicalities of this enterprise with the help of the only immaculate glass plate photograph actually available for research, the one retrieved in 2015 by Holger Pedersen (NBI, Copenhagen; European Southern Observatory) in the Archives of the Niels Bohr Institute (NBI, University of Copenhagen). Crucially, access to the official glass plates (Bodleian Libraries, Oxford) was denied; they were said to be "unavailable". Requests for scans remained unanswered. Moreover, the glass plates from Principe "disappeared", I was told. A perfect case study of Science Policy and its relation with the Politics of Science. It reflects at once the conflicting interests of openness and secrecy in the dissemination of scientific knowledge.
(*) See the 'Preface' of my forthcoming book *The molecularization of the world picture, or the rise of the Universum Arausiacum* (Groningen: Groningen University Press, 2022), 2nd edition, with the Planck-*h*-Einstein connection.

Meson or Mesotron: Etymology of Elementary Particles
- Helge Kragh
As I have argued in a couple of previous papers, the study of the origin and dissemination of names used in science constitutes a valuable historiographical resource. In this paper I consider the names of subatomic particles with an emphasis on those discussed in the period ca. 1932-1950, in particular those currently known as "positron," "meson," "nucleon," and "lepton." Why and when were these names proposed, and by whom? When and why were they generally adopted? What were the alternatives that did not survive? The naming of new particles was sometimes controversial, such as was the case with

"meson" which for more than a decade competed with "mesotron" and half a dozen other names. Leading physicists including C. Anderson, R. Millikan, H. Bhabha, C. Møller, L. Rosenfeld, and N. Bohr were involved in the debate concerning the nomenclature of the new particles found in the cosmic rays. The name "lepton" for light particles was introduced in 1946, but in a meaning somewhat different from the present use of the term. The paper throws new light on the etymology of elementary particles by making use of relevant correspondence between physicists in the period in question. In this way it contributes in a novel way to the historical study of early particle physics.

The Remodeling of Theoretical Physics across World War II seen Through the Emerging Concept of Virtual Particle

- Jean-Philippe Martinez

Now fundamental in quantum field theory, the concept of virtual particle was first sketched at the end of the 1920s in the Western European context of the rise of quantum mechanics. However, it did not take on its final expression and spread widely until 1949, with Richard Feynman's successful introduction of his famous diagrams. World War II, from its very first signs in the 1930s, had by then profoundly reshuffled the cards, North America having newly established itself as the main center of theoretical physics. For a time, the military conflict had even modified the very orientation of research and partially passed over in silence work judged too abstract or too sensitive because of its role in nuclear physics. In all this, geopolitical issues deeply shaped the long and winding path of development of the virtual particle concept. Then, in turn, a closer attention to the latter highlights the different migration dynamics of the actors of theoretical physics and with them the remodeling of its main centers of influence. Also, it puts forward the role played by peripheries, such as Japan, whose greater stability allowed a form of research continuity.

In summary, using the concept of the virtual particle as an illustration of the changes experienced across World War II by the theoretical physics community, this contribution aims to discuss the dynamic nature of the categories of "centers" and "peripheries" and the role of their interplay in the development of scientific knowledge.

106 - Sustainability and Biodiversity

Room: **AY.2.108**

Chair: Brigitte Van Tiggelen

Diversifying Green Revolution: Asian Vegetable Research and Development Center (AVRDC) from the Cold War to the Dawn of Sustainability, 1963-1988

- Leo Chu

The Asian Vegetable Research and Development Center (AVRDC), established in 1971 in Taiwan, is a unique institute of science diplomacy. Created by administrators from the Sino-American Joint Commission on Rural Reconstruction (JCRR), a body orchestrating Taiwan's postwar development, the Center's mission was to expand the scope of Green Revolution (GR) through the adaption of vegetables to tropical conditions. Nevertheless, the Center's survival was instantly threatened by the expulsion of the Republic of China (ROC) from the United Nations in 1971. To achieve financial stability, the Center adopted a pragmatic and versatile strategy that simultaneously allowed the ROC to showcase its agricultural achievement in Taiwan while attracting international scientists interested in reforming the GR to Southeast Asia. This paper aims to juxtapose the research of AVRDC and the transformation of the GR in the 1970s and 80s. As environmental movements in the Global North and critiques of

developmentalism from the Global South challenged the GR's emphasis on fertilisers, pesticides, and irrigation, the AVRDC presented its mandate as to *diversify* the GR by shifting its focus from cereals and calories to vegetables and nutrients, like vitamins and minerals. Besides, in its outreach programs in Thailand and the Philippines, the AVRDC combined vegetable breeding with small-scale, pesticide-free systems to accommodate both the emerging paradigm of sustainable development among its global donors and the ROC scientists' desire to overcome the diplomatic debacle through informal multi-lateral relations. The AVRDC's case thus sheds new light on the diplomatic roles played by these crop and nutrition scientists.

"Straight trunks" and "original biocenosis": production and conservation aims of Spanish foresters during the last third of the twentieth century at the Instituto Nacional para la Conservación de la Naturaleza

- *Max Bautista Perpinyà*

Here I present archival work on the 'Instituto Nacional para la Conservación de la Naturaleza' (ICONA), the nature conservation agency in Spain (1973-1995), largely managed by foresters (*ingenieros de montes*). I attend to their internal contradictions between their productivist aims and their conservation tasks. I describe the 1980s proposal of setting a national network of pine seed orchards, aimed at producing genetically superior seeds of "árboles plus" with phenotypically-salient traits in logging practices, like trees with straight trunks and few branches. I describe the way these foresters conceptualised local pine varieties, and how they attempted to join this practice of "genetic improvement" to their stated aim of restoring the "original biocenosis" of the forests, a steady state of preserved geobotanical diversity. I argue that in historizing the concept of 'biodiversity', it's important to decenter our narratives beyond the invention of the neologism during the 1986 BioDiversity Forum in Washington. Here I present a particular case of an understudied knowledge community (foresters) working in the European periphery, at the time when 'diversity' came to be a valuable good worth preserving and the object of protection in conservation science. My research shows that we can observe a tight yet often tense, relation between conservation and productivist aims. For the *ingenieros*, 'diversity' was both a goal to conserve and restore to the original steady-state, and a tool for increasing the productive output of reforestation practices.

From Goethe to Sustainability: Politics and Ideology of Sanfte Chemie

- *Marcin Krasnodębski*

Sanfte Chemie (or gentle/soft chemistry) was a concept developed in the late 1980s and early 1990s under the auspices of the German Green Party. Its proponents and theorists hoped to revolutionize the way we interact with the natural world and to make chemistry sustainable and environmentally friendly. While today it has been eclipsed by the much more popular American green chemistry, sanfte Chemie was a unique project rooted in the European environmental tradition, neo-Marxist conceptual frameworks, as well as in German idealism and even esotericism. The inspirations were not merely a background implicit in the project, but, on the contrary, there were explicitly incorporated into the theoretical foundations of sanfte Chemie.

The heralds of the project, Hermann Fischer and Arnim von Gleich, have continued to exercise an important influence on the development of the environmentally-friendly science and industry, but sanfte Chemie itself fell off the agenda of the Green Party. Still, even if it appears to be but a footnote in the history of global efforts for making chemistry more sustainable, in reality, it anticipated a great many further developments. Sanfte Chemie was a green chemistry *avant la lettre* and many of its insights are even more relevant today as we face the unfolding environmental crisis.

122 - Epistemic Cultures
Room: **AW.1.125**

Chair: Hannes Van Engeland

Exilic Epistemology as Geopolitical Capital: Contextualizing Seventeenth-Century Irish Responses to the New Sciences

- *Kevin Gerard Tracey*

Increasingly dislocated from their homeland by geopolitical violence, the émigré Irish figures of the early seventeenth century sought security in learned and clerical institutions; in the militaries of the Hapsburg and Holy Roman Empires; and, occasionally, amongst Protestant power-brokers conceiving of Ireland as a laboratory for empirical improvement. Though rarely spoken of in reference to the intellectual culture of early modernity, in each of these settings such figures engaged with developments in alchemy, astronomy, medicine, mathematics and natural philosophy. Their responses were formulated by autodidactic reading; pedagogical orthodoxy; personal influence; and experimental praxis, with contrasting opinions tested publically and privately by amateurs and specialists alike.

Facing 'heretical' opinions in physics, philosophy, and politics, these largely Catholic figures undertook knowledge-making projects combinining epistemic and narrative genres. They utilized personal connections and epistolary networks to conserve existing epistemological traditions, whilst offering erudite consideration to controversies on the form and nature of the heavens; on Aristotelian matter and Galenic medicine; and on the correct method for inquiry. Engagement with the new sciences and their disciplinary standards, practices, and modes of proof became for these dislocated figures social credit: credit which might then be refashioned as political capital.

Presenting research in progress on nodal figures, their networks, and sites of practice, this interdisciplinary paper explores Irish input into contested cultures of early modern knowledge-making. It highlights points of contact and conflict betwe differing national, confessional, and philosophical identities, and traces Irish responses to reconfigurations of epistemic knowledge in convulsive political and philosophical spaces.

On the Transition from Aristotelian Syllogistic Logic to Fregean Symbolic Logic

- *Ladislav Kvasz*

Aristotelian logic was considered a correct representation of valid logical reasoning until Frege in 1872 introduced an alternative. So Kant in 1787 and even Boole 1854 considered Aristotelian logic as flawless. Boole's point was only to render the syllogistic patterns more conspicuous by means of algebraic symbolism. In *Patterns of Change* (Birkhäuser, 2008) I reconstructed the introduction of Fregean logic as the introduction of a new **tool of symbolic representation**. Nevertheless, the analysis of the conventions that constitute the new representational tool did not shed light on the transition from the Aristotelian system of syllogistic logic to the modern system of symbolic logic.

Both schools of symbolic logic, the Boolean and the Fregean, achieved this transition by applying **elements of mathematical language** to logical content. Boole took the elements from algebra, Frege from the theory of functions. Thus the analysis of these representational tools could not shed light on the character of the transitions as the logical aspect remained unanalysed.

In the paper I suggest an interpretation of Aristotelian logic as a system that is closer to elementary arithmetic (or simple reckoning) than to Euclidean mathematics. I introduce the notion of **compositional synthesis** as the way how a theory constructs complex representations out of elementary ones. In case of Euclid, the compositional synthesis had the form of a construction, the steps of which were sanctioned

by the postulates. In the case of reckoning the compositional synthesis consists in repeated addition of a unit to the counted things. Similarly, I introduce **relational and deductive synthesis**. I will argue, that the compositional, relational and deductive synthesis of Aristotelian logic is of the arithmetical rather than the Euclidean kind.

That means that the transition from syllogistic to symbolic logic was a deeper change than just a change of the tools by means of which we represent the logical content. The logical content itself underwent a radical transformation. Concepts, propositions and arguments stopped being modelled after classificatory concepts and propositions concerning inclusion used in arithmetic.

Insects as Food Sources in Modern Europe: Images as Epistemic Tools and Framing Devices of the Natural World

- *Milton Fernando Gonzalez Rodriguez*

This paper examines the role of images and accompanying texts as epistemic tools and framing devices in the circulation of ideas about insects as food and medicine in Western Europe (1880-2020). When examining historical sources of various genres and mass media formats, special attention is paid to the concepts of food neophobia (reluctance or avoidance of new foods) and entomophagy (insects in the human diet) in terms of health and naturality. Specifically, the focus is made on two case studies. First, the paper investigates the various stages of *Dactylopius coccus* (cochineal scale insects) as a medicinal substance and food additive in the 19th and 20th centuries. Second, it reviews the introduction and increased consumption of health-enhancing compounds and food preparations made of insects of the Orthoptera order (e.g. crickets) in the 21st century. In both cases, images are discussed as sources for adding a new comparative viewpoint on entomophagy from a historical and nutritional perspective. I argue that the circulation of preconceptions about insects, not necessarily as food, but as healthy or unhealthy food sources, is directly or indirectly linked to visual and textual framing strategies. Using various examples, I show the didactic aspect of disseminating information about insects as substances for human consumption. Despite the widespread association of entomophagy with indigenous lifestyles and unpalatable tropical diets, I demonstrate that insects have also been part of the Western European culinary and therapeutic repertoire.

123 - History of Scientific Institutions

Room: **AY.2.114**

Chair: Annette Lykknes

The Establishment and Development of the State Institute of Archaeology (1919-1952) in the Light of Archaeologists' Correspondence

- *Marcela Starcová*

I would like to join the symposium *„Science policy in Central Europe in the 1st half of the 20th century in the mirror of correspondence of scientists."*

In my paper I would like to present the correspondence of Lubor Niederle and Jaroslav Böhm as the case studies for studying the history of scientific institution. In correspondence with important personalities from the field of prehistory and politics, it is possible to trace behind-the-scenes negotiations about the creation, status or important milestones in the development of this institution during its existence.

The founder of the SIA was the well-known anthropologist, archaeologist and slavist Lubor Niederle, who also became the first director of the institution. Together with his fellow prehistorians, Niederle

negotiated the establishment of the new institution with representatives of the Ministry of Education as early as 1918, in the interwar period, he was able to use his contacts with the first Czechoslovak president T. G. Masaryk to strengthen the position of the institution and to obtain significant financial support for archaeological research.

Böhm's efforts to consolidate the position of the Institute in the spirit of Niederl's concept after World War II resulted in the incorporation of the institution into the Czechoslovak Academy of Sciences.Böhm personally participated in building the Academy as vice-chairman of a government commission and close associate of the Minister of Education and later President Nejedlý.

Successful Institutionalization without an Institute to Show for It: The Case of the IOWO 1971-1981

- Elske de Waal

In 1971 the IOWO (Institute for Development of Mathematics Education) was created to develop arithmetic and mathematics curricula in the Netherlands. In 1981 it was closed, because all curriculum development was assigned to one national institution: the SLO (Foundation for Development of Curricula). Only the research of the IOWO was continued in a department at Utrecht University, the OW&OC (Research Mathematics Education & Education Computer Centre). Not long after the project to develop the renewed curriculum for mathematics for the secondary level was appointed to the OW&OC.

The historiography of institutionalization, legitimization and expertise often focuses on boundary work. I argue, however, that for IOWO, collaborating with non-academics (teachers) was instrumental for its success and survival.

Based on archival material and interviews, I identified two important factors in IOWO's success: its inclusion of stakeholders in its work, and the commitment of the staff. IOWO foregrounded the participation of stakeholders in developing educational materials. This emphasis on inclusion of stakeholders can be understood in the context of the democratization movement that started in the 1960s.

Secondly, the commitment of the staff to ideas and methods of the IOWO was crucial in the establishment of expertise. This was perhaps due in part to the idea that mathematicians were a special tribe with a special mission. When staff was invited to apply for a job at SLO, most refused and those who did were ostracized. Therefore, when the new development project needed assigning, the required expertise was not at SLO, but at OW&OC.

A Milestone in the History of Genetics: University of Sevilla's Genetics Department

- Enrique Wulff

The combination of physics and genetics to explain genes Luria and Delbrück opted for, resulted in their spanish collaborator Enrique Cerdá creation of the department of genetics at the University of Sevilla. But the explanatory power of Phycomyces as model organism was found hard to justify, and the work on it did not have a great impact. With the objective of increasing his political vision of science, the spanish researcher imposed as a priority the investigation on Phycomyces. Cerdá needed quick and effective results, all in fashion; to test the stability of this idea, to show that it was indispensable and inevitable for American scientific creativity. Cerdá intervenes in the problem from a position that encourages the political climate that must occur for the diffusion of a new technology to be effective. We end up with a streched present. Cerdá had a great sense of control, his practical activities produce results, and he demonstrated no small reproductive capacity as far as theory was concerned. These are the reasons why the historiographical study of fashion converges towards a form of organization, where the fundamental political problem is resolved. What in Cerdá's case, is the meaning of time for a scientist as a criterion for distinguishing the structure of his community.

11:00-13:00 - Sessions

26 - (In)credible Scientists

Room: **AW.1.125**

Organiser: Hannah Erlwein

Chair: Hannah Erlwein

Session Abstract:

Historical and sociological questions about scientific credibility have become especially relevant during the COVID pandemic, and are widely discussed. Among the academic community, however, it seems that the focus is on science as an abstract product rather than on the people who produce this science. Our symposium intends to shift this focus and ask: How does scientific credibility become attached to and embodied by specific scientists or scientific communities? How is the credibility or trustworthiness of a given science dependent on this embodied credibility? Our aim is to explore two particular kinds of embodied scientific credibility in the premodern and early modern sciences: the epistemic credibility of achieving, expressing, or teaching scientific knowledge, and the social credibility of having a particular status, background, access, or capital required to be scientist. All four papers will explore the relationship between these two kinds of credibility as embodied in scientists or scientific communities. We argue that the sciences are, and have been, never pure ideals, methods, or bodies of knowledge, in the words of Steve Shapin, but "produced by people with bodies, situated in time, space, culture, and society, and struggling for credibility and authority." If credibility is always a contingent achievement of a specific scientific person and culture, there is and can be no abstract theory of scientific credibility across the sciences or abstracted from historical scientists. Credibility is rather the production of a consensus about specific scientists or scientific communities. By focusing on science as embodied by scientists, each paper will analyze the tensions between 1) scientific ideals and scientific practices, and 2) the relationships between the epistemic dimensions of what credible scientists know (and how they achieve, express, or teach that knowledge) and the social dimensions of who credible scientists are (including their social location, training, character, and institutional or group affiliation).

Gatekeepers of Science: Debating Credibility in the Premodern Islamic Context

- Hannah Erlwein

Practitioners of the premodern Islamic science of *kalām* ("speculative theology") thought highly of themselves: Theirs was the most noble of all sciences as they dealt with the most noble object, i.e. God; on their formulation of orthodox beliefs nothing less than the salvation of the laypeople depended; and they knew just how the world was evidence for God.

But not everyone held the practitioners of *kalām* in such esteem. In my presentation, I will discuss the harsh critique put forward by the practitioner of another - rivalling - Islamic science, i.e. *falsafa* ("Hellenising philosophy"), Ibn Rushd (Lat. Averroes, d. 1198 CE). He calls into question their credibility and authority as practitioners of science: On the one hand, they fall short of embodying the high epistemic standard of science and scientific proof. It can hardly be said that they are "scientists" at all. On the other hand, they fail to properly embody the role of scientists in society. Instead of maintaining the appropriate boundary between practitioners of science and laypeople, they disseminate (pseudo-)scientific discourse among the masses. This does not contribute towards the declared goal of theology, i.e. securing orthodox belief, but instead has harmful consequences for society at large.

***Esprits forts*, Credibility, and Scientific Community in the Montmor Academy, 1654-1664**

- Julia Reed

In the decade or so before the foundation of the Académie des Sciences by King Louis XIV in 1666, a semipublic scientific society met at the Paris home of Henri-Louis Habert de Montmor, a member of the Académie Francaise and important figure in literary *salon* culture. The "Montmor Academy" included scholars who would later be founding members of the Académie des Sciences: Jean Pecquet, Jean Roberval, and Frénicle de Bessy, among others. A formal set of rules was drawn up in 1657 emphasizing the exclusively scientific—as opposed to literary—focus of the group, membership in an international scientific community nurtured by correspondence, and open debate about all scientific questions. As a predecessor of the Académie des Sciences and active in the decade before the founding of the Royal Society, the dynamics of the Montmor Academy are an important window onto the social, cultural, and epistemic dimensions of scientific credibility in the context of a short-lived scientific society. In this paper, I analyze the debates over credibility in the Academy in the decade before its dissolution in 1664, particularly the requirements for membership—being of sufficient character and learning—and the proper procedures for meetings. I ask how the group understood (and disagreed about) the nature of the scientific public and the moral, social, and intellectual standing of potential members, as well as the mode and method of scientific communication.

The Social and Epistemic Makings of a Scientist in Seventeenth-Century Germany

- Tracy Wietecha

Early members of the *Academia Naturae Curiosorum Leopoldina* encountered new plants and minerals from the Americas and Asia. They published their descriptions, classifications, and illustrations of these encounters under the title of *Observationes* in the insitute's official publication, the *Miscellanea Curiosa*. Yet, observations and judgements on new natural materials and medicinal remedies were appropriated into the common body of scientific knowledge based upon the embodied scientist who put forth such knowledge. For example, Leopoldina member Christian Mentzel published his correspondence with Georg Rumph, who would later become a member of the Leopoldina academy. But before Mentzel offers observations from Rumph and himself on new materials of tree bark Rumph had collected, Mentzel first establishes the credibility of Rumph as a scientist: he served in the East India Company and was head merchant on the island of Ambonia. Rumph's knowledge and observations were credible and trustworthy because Rumph himself was a scientist who could be trusted - he fulfilled not only the epistemic but also social requirements for credibility and trustworthiness. This paper explores the conditions under which one's credibility and observations as a scientist could be trusted and incorporated into existing bodies of scientific knowledge. It looks at the social and epistemic standards which established early members of the Leopoldina as trust-worthy scientists and how those standards were put into practice by the scientists themselves.

63 - Recipes, Experiments and the Interplay between Practice and Concept-formation in Early Modern Philosophy

Room: **UA.4.222**

Organiser: Oana Matei

Chair: Oana Matei

Session Abstract:

The recipe format was very successful in early modern Europe. In the process of recording, writing and exchanging recipes, expertise-claims were negotiated, new communities were born, and knowledge begun to change its shape and function. Gradually, the recipe format evolved into something more similar to the experimental report format (Borrelli 2014; Eamon 2011, 2017; Jalobeanu and Pastorino 2014; Jalobeanu 2018; Pastorino 2013). Some have described this transformation as an increasingly sophisticated process of codification and abstractization of practical knowledge (Dupré 2017; Valleriani 2017). Other scholars attempted to describe the transformation of recipes into experiments in terms of changes in styles and genres of writing (Blair 1999; Pomata 2011, 2014). This panel proposes to approch this transformation as a complex process of disambiguisation of the codified, tacit knowledge embodied in what was called „recipes" through repeated tests and trials. Jalobeanu's paper proposes to read a particular class of experiments as „re-enactments"of recipes proposed by Francis Bacon in Historia densi et rari with the aim of introducing theoretical concepts such as „folds of matter and „spring of air." Bujor's and Dobre's paper focuses on a class of experiments included in the commentaries of Clarke's translation of Jacques Rohault's Traité de physique (1697) in claiming that Clarke's Rohault marks a shift in a political agenda regarding early modern science. Matei's paper looks at Nehemiah Grew's experiments with plants in order to delineate his conceptual vocabulary regarding the fundamental processes of nature, such as vegetation, fermentation, digestion. But the transition from recipes to experiments does not always lead to scientific experimentation. Sometimes, the end product is something different and it has to do with the production of new and useful objects. In this sense, Goldberg's presentation explores the idea of experience coming from recipes in maintaining the household health in early modern times.

Vegetation, Fermentation, and Digestion. Nehemiah Grew's Conceptual Vocabulary in "The Anatomy of Plants"

- *Oana Matei*

Nehemiah Grew (1641-1712) was a physician, a botanist and a natural historian. Grew devoted more than a decade of his life to the building of a new experimental discipline, for which he proposed at least two different names: "phytological science" and "philosophical history of plants."Grew's works on the anatomy of plants (1672; 1673; 1682) present the microscopic structure, organization and functioning of plants; apart from that, Grew's research projects allowed him to question and investigate the fundamental process of vegetation in the case of plants using microscopic lenses and to delve into its multiple stages of filtration, separation and mixture. This presentation focuses on Grew's use of vocabulary in describing the processes through which a seed becomes a mature plant. I will try to delineate what Grew has understood by vegetation, fermentation and digestion. I will also try to capture the existing relation between these concepts and to identify how Grew used them in different contexts.

Bubbles, Bladders and the "Folds of Matter": Enactment and Concept Formation from Bacon to Boyle

- Dana Jalobeanu

In this paper I look at a class of experiments which became extremely popular in the second part of the seventeenth century, experiments involving bladders and bubbles of air. These were traditionally subsumed under the class of barometric experiments. I propose to look at them from a different angle, as investigations into the process of rarefaction and condensation. And I will pay a special attention to the instrument used to enact such experiments, i.e, the bladder. Unlike the barometric tube or the vacuum-pump, bladders are instruments non-familiar to the modern eye. I will show that it is easier to understand what is at stake in these experiments if we read them as re-enactments of recipes and suggestions formulated by Francis Bacon in his *Historia densi et rari.* I also show that these experiments were used by Francis Bacon and Robert Boyle, respectively, to introduce theoretical concepts, such as "folds of matter" (*plica materia*) and the "spring of the air."

The Reception of Jacques Rohault's *Traité de Physique* (1671): From Antoine Le Grand to Samuel Clarke

- Ioana Bujor & Mihnea Dobre

The renewed translation of Jacques Rohault's *Traité de physique* into Latin, published in 1697 by a young Cambridge graduate, Samuel Clarke, was from the beginning highlighted as a significant achievement. On the one hand, the text was considered more accurate than the largely circulated translation prepared by Théophile Bonnet in 1674. On the other hand, the new Clarke edition replaced the commentaries of Antoine Le Grand, which supplemented Rohault's text in numerous editions since 1682. The paper aims to examine the context surrounding the second point, with a focus on the class of experiments included in the notes. It addresses a twofold question: was there any reason behind the shift to a new set of commentaries, and if so, did it lead to a fresh (and maybe different) perspective on Rohault's treatise? In other words, we investigate the puzzling transition from Le Grand's more extensive set of comments to Clarke's "annotatiunculæ" (the first edition of the very popular Clarke's Rohault, reprinted numerous times in the early eighteenth century). At a more general level, we explore the politics of promoting a different natural philosophy, marking the shift from Cartesianism, and opening the path towards Newtonianism. The fate of Le Grand's set of annotations to Rohault's treatise illustrates best how such transition might be backed up by a "political" agenda in an effort to promote the new science of the early modern period.

Concepts of Experience in Royalist Recipe Collections

- Benjamin Goldberg

This presentation explores the idea of experience and its epistemological and practical role in maintaining the health of a household among early modern English Royalists. A number of prominent royalists during the mid-seventeenth century British Civil Wars expended quite some effort in the collection of medical recipes, including Queen Henrietta Maria herself, as well as William and Margaret Cavendish, and the Talbot sisters, Jane Grey and Alethia Howard. This essay looks at these Royalists and four of their collections: three published (Henrietta Maria, Grey, Howard), and one manuscript (the Cavendishes), in order to determine how they conceptualized experience and its role in medical practice. The claim that such recipe collections represent a new, anti-Aristotelian idea of experience as a specific, particular event is disputed through a quantitative and qualitative analysis of these collections. Instead, it is argued that there a number of related conceptions of experience found in these Royalist recipe collections, but the basic idea is one where experience indicates long experience or expertise, an idea

that can traced back at least to humanist medicine of the Renaissance, and likely back to Galen.

76 - Politics and the Public Sphere in Recent German Science: The Case of the Max Planck Society - 2

Room: **AW.1.120**

Organiser: Mitchell G. Ash

Chair: Carsten Reinhardt

Session Abstract:

The Max Planck Society (MPS), founded in 1948 as the legal successor to the Kaiser Wilhelm Society, is today the leading organization for top-level research in Germany, funded in equal shares by the Federal government and the German *Länder*. In order to establish and maintain this strong position in the German research system, the Society's leadership and the heads of its institutes (MPIs) engaged actively with political authorities, as well as the media. The interdisciplinary research program „History of the Max Planck Society" has been investigating these developments since 2015, with the aim of uniting history of science and contemporary German history. The proposed Symposium presents a selection of results from this large-scale project, now nearing completion, in two parts.

Symposium 1 addresses the political aspect of this topic, including the financing of the MPS (Jaromír Balcar), the role of the MPS in science diplomacy (Carola Sachse), and the role of the MPS in the process of German unification (Mitchell Ash).

Symposium 2 addresses the role of the MPS in the public sphere, focusing in particular on the conflict of the MPS with the Scientology movement over the role of Kaiser Wilhelm Society scientists in the Nazi-era „euthanasia" program (Florian Schmaltz) and the decades-long confrontation with the animal welfare and animal rights movements (Juliane Scholtz). The Symposium will end with a commentary from The Symposium will end with a commentary from John Krige, an expert on the history of science and technology during and following the Cold War.

The Max Planck Society's Nazi past as a Political Challenge: Legal Conflicts Surrounding Scientology's Instrumentalization of the Kaiser Wilhelm Society's History against the Max Planck Society

- *Florian Schmaltz*

In 1985, historian Götz Aly published an article showing that the director of the Kaiser Wilhelm Institute for Brain Research, neuropathologist Julius Hallervorden (1882-1965), had acquired brains of Nazi 'euthanasia' victims and brain specimens of at least 33 children gassed at the Brandenburg killing center on October 28, 1940, which were still kept at the Max Planck Institute for Brain Research. Aly also argued that the Max Planck Society had suppressed articles by journalist Hermann Brendel in the 1970s claiming that institutes of the Kaiser Wilhelm Society had conducted brain research within the framework of 'euthanasia'. Newly discovered sources show that these articles were published in a newspaper run by the German branch of Scientology, of which Brendel was editor-in-chief, as part of Scientology's anti-psychiatry campaign. They mixed historical facts about racial hygiene and 'euthanasia' in Nazi Germany with ludicrous, unfounded accusations alleging that violent, racist and dehumanizing research methods typical of Nazi research were still carried out at the Max Planck Institute for Psychiatry. The resulting legal conflict between the Max-Planck-Gesellschaft (MPG) and Scientology lasted from 1972 until 1975. In

contrast to trials of Nazi era 'euthanasia' perpetrators, the civil law case of the MPG against Scientology instrumentalized the Nazi past of psychiatry and brain research for ideological and commercial purposes. The Scientology case caused social and legal ripples which extended to 1986, when the MPG considered taking legal steps against Aly's publication.

'Are we Willing to Fight for our Research?': Max Planck Society's Lobbying and Communication Strategy during the Reforms of the Animal Welfare Act in Germany 1986-2002

- Juliane Scholz

The presentation analyzes how the Max Planck Society (MPS) tried to influence German politicians and launched a media campaign in favor of operations on live animals for scientific purposes, accompanying the revisions of the Animal Reform Act in 1986 and 1993. In the 1970s the Animal Rights Movement had significantly increased their actions against animal testing in biomedical research. With the help of a graphic media campaign and with support of more militant groups, who were willing to 'liberate' or 'free' animals and also attack research facilities, the animal rights groups gained influence on German legislation and public opinion. Consequently, in 1972 the social liberal government introduced a new Animal Welfare Act – succeeding the initial national socialist law of 1933 – which contained strict rules on the use of animals for research. The possible research restrictions of the legal reform led to a wake-up call on the part of the MPS, whose institutes relied on experiments with vertebrates like cats or dogs and primates. When a molotov cocktail was thrown into the Max Planck Institute of Brain Research in 1989 and the directors Heinz Wässle and Wolf Singer and their staff were terrorized, the MPS changed its science policy drastically and initiated an active lobbying campaign. In the 1990s, the animal rights movement worked to establish animal rights alongside human rights in the German constitution. To this the MPS and the German Research Council (DFG) responded with a refined, more moderate communication campaign, which highlighted transparency on this highly polarizing issue.

Comment: John Krige

80 - Appropriating the Science of the Past: Scholarly Intentions and Ideological Constraints

Room: **UB.2.147**

Organiser: Daria Drozdova

Chair: Daria Drozdova

Session Abstract:

The 19th century ideal of neutral and objective historical knowledge has been easily shattered by the persistent practice of using history as an instrument of ideological and political rhetoric. The heroes of intellectual history, philosophers and scientists, are often used to symbolize practical and epistemic virtues that the current ideology wants to emphasize. For example, in 19th century Italy the myth of Galileo the fighter for freedom of science against the obscurantism of the Catholic Church was created to give ideological significance to the Risorgimento movement, while in Germany the desire to find national roots of modern science produced the focus on Kepler as the prototypical genius of the Scientific Revolution.
Current tendencies toward revision of dominant narratives in the history of science and philosophy raise the question of the factors that lead to the narration of a "heroic past" in which some historical actors are elevated on a pedestal and others are consigned to oblivion. In this panel we would like to examine the

circumstances and mechanisms of the emergence of such narratives by bringing together various examples of rhetorical 'heroisation' of various figures or events of scientific past. In the first part of the panel (Akopyan, Drozdova) we are going to explore cases when the reference to the leading figures of the scientific revolution (Newton, Bruno) was conditioned by current ideological tensions with oppressing religious environment. The second part of the panel (Volkov, Bayuk) is focusing on figures of historians (monk Iakinf, V. Zoubov) whose professional choices are conditioned by their inner convictions and external constraints.

Image of Giordano Bruno, Hero and Martyr of Science, in Late Nineteenth-century Russia

- *Daria Drozdova*

Russian intellectuals were attracted by the figure of Giordano Bruno all through the 19th century, but their interest became even more explicit in the second half of the century, after the publication of papers of his inquisitional process. Since 1860 a number of texts describing Bruno's life and doctrine have been produced, not only in academic press but even in books for children and youth. Most of them presented Bruno in a very enthusiastic way, seeing him as a real hero and martyr who defended a new cosmological vision against the scholastic obscurantism and who sacrified his life for the progress of human science and philosophy. However, this enthusiasm raised some objections from orthodox intellectuals who insisted that Bruno was just a representative of early stages of modern science development, quite obscure and naïve.

In my talk I'm going to address the particular reasons which led (some of) Russian intellectuals of the late 19th century to give such a special attention to Giordano Bruno. Taking into account two influential expositions of Bruno's life (A.N. Veselovsky, 1871) and doctrine (N.Ya. Grot, 1885) I argue that they are using the image of Bruno, portrayed as a victim of Catholic inquisition, in order to emphasize values of scientific progress and free scientific and philosophical research in a way which can be acceptable to Russian governmental and ecclesiastical censorship.

Monk Iakinf (Nikita Ya. Bichurin, 1777-1853) and his Interpretations of Zhou Dunyi's 周敦頤 (1017-1073) Taiji Tu Shuo 太極圖說 (Explanations of the Diagram of Great Ultimate)

- *Alexei Volkov (琅元)*

The life and work of the Russian Orthodox monk Iakinf (Nikita Ya. Bichurin, 1777-1853) have been studied extensively by a large number of scholars, in particular, in Russia and USSR. The reason for this interest was related primarily to his sinological activities: he was often mentioned as "the father of Russian sinology". Bichurin stayed in China from 1807 to 1821 and was fluent in Chinese and Manchu languages. After his return to Russia he published extensively; his publications included his original works on China, East Asia and Central Asia as well as translations of Chinese texts. The present paper is devoted to one of them, namely, to his translation of one of the foundational texts of Neo-Confucianism, Zhou Dunyi's 周敦頤 (1017-1073) treatise *Taiji tu shuo* 太極圖說 (Explanations of the Diagram of Great Ultimate). During his lifetime Bichurin published two translations of this treatise (in 1832 and in 1840) that differed considerably. They certainly deserve scholarly attention given that they were the first translations of this foundational text of Neo-Confucianism into a Western (Russian) language and contained Bichurin's renderings of the commentaries on the treatise written by Zhu Xi 朱熹 (1130-1200), one of the most influential philosophers in Chinese history. In my paper I will especially focus on Bichurin's interpretation of the Chinese philosophical concepts found in Zhou's treatise, in particular, *yin* 陰 and *yang* 陽, in terms of the Western natural sciences of the 19th century.

Vassilii Zubov and Shadows of Giants

- Dimitri Bayuk

Vassilii Zubov used to be among the most remarkable Russian historians of science of the Soviet period. At the end of his life, his works attracted a wide international attention: he was elected a member of the *Académie Internationale d'histoire des sciences* and decorated with the Sarton medal. In my talk, I will analyze his life as a historian of science under the Soviet regime and clarify how ideological constraints deformed his original scholarly intentions.

His international reputation is mainly due to the publications devoted to Leonardo da Vinci. This research was closely related to his other works on Leon Battista Alberti, Aristotle's reception in the Renaissance, atomism, and theories of motion in Early Modern science. Almost in all these investigations, Zubov claimed that one of his most important achievements had been the discovery of a substantial medieval component hidden in the presumably revolutionary theories of Renaissance and Early modern science. Eventually, by the end of his life, Zubov's scientific interests turned exclusively to medieval subjects, in particular, to medieval predecessors of Galileo.

Posthumous Zubov's publications revealed his deep religiosity. As devote Orthodox Christian whose religious interests were mixed with patristic and scholastic traditions, he must have been convinced that the influence of Western European theological thought on the development of sciences had to be positive rather than negative. The ideological environment forced him to conceal the real motives of his scientific research. Only at the very end of his life he dared to express his opinion on the subject.

Discussion

81 - The Political Economies of the Earth Sciences

Room: **AY.2.114**

Organisers: Gustave Lester & Victor Monnin

Chair: Charlotte Abney Salomon

Session Abstract:

This symposium examines the political and economic histories of the earth sciences. Although much historiography has focused on the evolution of ideas, methodologies, and practices leading to the "discovery" and detailed illumination of Earth's deep past, earth scientists have also been longstanding recipients of state and industrial patronage for the commercial and strategic value of their work. Indeed, recent scholarship exploring the historical relationship between the development of the deep past and the territorial expansion of empires and growth of fossil fuel economies has revealed a history of knowledge fully entangled in the political and economic contexts of its production. Each of the presentations in this symposium—ranging from 18th century Austria to 20th century India—represents an original contribution to this historiographical approach, characterized by an attention to both local political economy and growing international networks of expertise. If, at a larger scale of analysis, the vast community of earth scientists were indeed uncovering the geological structure of the globe and reconstructing extinct species; at a much narrower scale, the production of scientific knowledge, the control of territories, and the exploitation of lands and resources were determining one another. Our panel thus aims to encourage a wide-ranging discussion about the mutual shaping of the earth sciences and their territorial and extractive objects.

Between Extraction and Exegesis: The Politics of Mining and Cosmologies in the Austrian Low Countries, 1769-1792

- *Mathijs Boom*

In the later years of the *ancien régime*, the Habsburg government sought to bring Enlightenment improvement to its peripheral territories in the Low Countries, with their stagnant scientific culture and a sluggish economy. This paper explores the uses of 'geological' knowledge during this turbulent era. While religious authorities at Louvain's university worried about the cosmological implications in the study of earth's history, political authorities were eager to develop new mining concessions. The paper will chart the interactions between the learned savants of Brussels' newly-established Imperial Academy, the representatives of the Austrian Empire, and practical world of mining. It will draw on the archive of the country's Inspector General of the Mines François-Xavier de Burtin (1743-1818). As a learned naturalist, mineral collector, *académicien*, and government official, Burtin operated at the intersection of knowledge production and the mineral economy, confronting questions of both cosmological exegesis and mineral extraction. With his wideranging knowledge of fossils and minerals, he sought to direct the mining operations in a land that would soon become one of the main sources for European coal. With this little-studied episode, the paper aims to contribute to the history of knowledge in the Austrian Low Countries, as well as to the history of the political economy of mining in the Belgian territories.

Science, Settler Colonialism, and Extraction in the Upper Mississippi Valley, 1780-1840

- *Gustave Lester*

Many historians stress the mining of North American raw materials in their explanations for the origins of US industrial power by the turn of the twentieth century. Explanations for the emergence of a late nineteenth century US industrial mining sector have, in turn, been tied to a supposed disinterest or irrelevance of North American minerals to the political economy of the early republic and the rise of large-scale state investments in the production of geological knowledge about the continent after the US Civil War. By contrast, this paper draws attention to the significant interest and investments of early US leaders in the production of geological knowledge about mineral-rich lands beyond the shifting borders of the US empire. I argue that the most significant obstacle to the rise of mineral-intensive US industrial manufacturing was not insufficient state investments in geological knowledge, but rather the power of Indigenous nations to resist US expropriation. In particular, this paper focuses on the relationship between the end of overseas imports of lead into the United States and longstanding efforts by US leaders to acquire geological information about and dispossess the well-known lead mining districts of the Ho-Chunk, Sauk, and Mesquakie nations of the Upper Mississippi Valley. In doing so, I aim to illuminate the processes by which the settler colonial territorial mission articulated at the founding of the United States came to encompass an imperial political economy of continental industrial extraction.

Shaping Invertebrate Fossils and Microfossils into Tools of Extraction, 1810s-1920s

- *Victor Monnin*

Histories of paleontology have primarily been focusing on cases involving macrofossils, in particular vertebrate fossils. Indeed, the application of comparative anatomy principles to the reconstruction of extinct species constitutes one of the most significant achievements of nineteenth-century paleontology. In contrast, the history of the study of invertebrate fossils and microfossils has been left relatively uncharted. This bias reflects the propensity for considering the history of paleontology mainly as one of scientific discoveries about the Earth's deep past. This presentation argues that by focusing on invertebrate and micro- fossils one can better appreciate the historical relationships between

paleontological knowledge and economies of extraction. The first part of this presentation will demonstrate how, at the turn of the nineteenth century, invertebrate fossils were recognized and shaped as strategic tools of prospection and land improvement. As the nineteenth-century progressed, identifying specific species of invertebrate fossils became a critical part of mining schools' curriculum, and a sought-after source of information for investors and other stakeholders. This presentation ends by discussing how, at the beginning of the twentieth-century, microfossils became a powerful asset for oil companies. Employed by such companies in Texas, Esther Appling (1895-1972), along with Alva Ellisor (1892- 1964), and Hedwig Kniker (1891-1985) developed a method of stratigraphic correlation using *Foraminifera* to predict the presence of oil reserves in the Gulf of Mexico. Focusing on microfossils can bring under a new light both matters of resource extraction and division of labor within paleontology.

Products of the Mineral Kingdom: Mineral Science in Sweden, 1740-1820

- *Charlotte A. Abney Salomon*

Throughout the eighteenth century and into the nineteenth, members of the Swedish scientific community produced a steady stream of influential mineral research, with their findings lauded and republished throughout the European and North American scientific community. Many of the Swedish researchers who published their work in scientific journals were employed as officials with the state Bureau of Mines, the government regulatory agency that managed the mining industry and broadly supported the field of mineralogical chemistry. While this work is commonly viewed through the lens of the modern disciplinary boundaries of chemistry and geology, Bureau officials defined themselves as working within "mineral science," a field encompassing specifically the natural history and natural philosophy of the mineral kingdom. As a scientific discipline developed within and for the direct, in-person management of the mining industry, "mineral science" was built upon material engagement with its subjects of study, necessarily including first-hand observation of and contact with minerals both in the laboratory and at field sites across the Swedish landscape. Access to mine shafts, quarry walls, and industrial byproducts thus functioned as privileged access to research subjects and raw materials. The Bureau's need for a large corps of trained mineral analysts created an expansive and collaborative network of researchers sharing tools and methods. The interests of the state and the mining industry were not simply the targets for the application of Bureau science, but provided both the driving motivation and the underlying logic of the work.

88 - Gender Perspectives on the History of Science

Room: **H.1.302**

Chair: Marie Linos

Poland v. Gender Studies: The academic Fight for Equality and the Government Backlash

- Daniel Sunderland

In 2016, Maciej Duda published a book titled *Dogmat płci. Polska wojna z gender* [*Dogma of Sex: The Polish War on Gender*]. This much-needed yet little-known work has provided the readership with a comprehensive chronicle of an unprecedented campaign against the "gender ideology", led by the Polish priests and conservative politicians from 2007. A decade later, it seemed that the time had come to summarise this conflict, as it had been slowly fading into the far background of the public debate.

Not long after the author had submitted the final version of his manuscript, the rightwing party Prawo i Sprawiedliwość [Law and Justice] won the parliamentary election in Poland. This victory has reignited the discussion on gender studies and provided "antigenderists" with a bully pulpit to discredit the field. The ruling party has played into their sentiments by threatening to cut the funding of gender and feminist programmes, replacing an established scholar holding the position of Government Plenipotentiary for Equal Treatment with a figurehead and disbanding the Council for the Prevention of Racial Discrimination, Xenophobia and Intolerance.

In this talk, I will aim to capture and analyse the primary reasons that have caused this shift and put the discipline on trial yet again, complementing Duda's book with a postscript. A postscript all the more needed as the case of Poland, argued Elżbieta Korolczuk and Agnieszka Graff, is not an isolated but "a paradigmatic one — and an important predictor for possible future developments in Western Europe".

The Canon of the History of Science through a Gender Perspective

- Anne-Sophie Godfroy

Women are not very present among the great scientific figures in the history of science, even in the twentieth century and beyond, when they have reached university and academic positions, and many of them have made major discoveries or significant contributions. In this paper, we will investigate how the mechanisms of constitution of the 'canon' can provide us with insights into the mechanisms of invisibilisation of women in the history of science.

This reflection is based, on the one hand, on papers presented in sessions organised by the IHUPST/DHST Commission on Women's and Gender Studies in ESHS or ICHST conferences and, on the other hand, on a workshop organised with Lisa Shapiro in 2022 at the Ecole Normale Supérieure. In this workshop, the construction of the canon in literature, philosophy and history of science was analysed and compared to reveal similarities and differences. Shapiro is involved in the New Narratives project, which aims to include women thinkers to « reconfigure, enrich and reinvigorate the philosophical canon » (see http://www.newnarrativesinphilosophy.net).

The specific challenges of the history of science and technology will be explored, as well as the possibilities of reconfiguring the scientific canon by introducing female figures. We will examine how a gendered perspective on the canon contributes to reconfiguring the history of science, historiography and science itself, and how it also redefines the canon itself. While the canon seems eternal and universal, it reveals how it is constantly revised and reconstructed.

Governesses in the Kingdom of Poland (1864–1904) in the Context of Class and Gender

- *Alicja Urbanik-Kopeć*

In my presentation I will analyse professional, educational, and emancipatory aspirations of governesses in the Kingdom of Poland from the January Uprising to the brink of the 19th and 20th centuries in the context of the existing social conventions and the expectations placed on this group.

Many women who decided to work as governesses were those who were unable, because of financial, political or social reasons, to access higher university education. Some were alternating between studying abroad and private tutoring to gain funds. Therefore, the situation of governess can be analysed in many aspects: educational policy, nationality, modernity.

Governesses were a professional group that appeared to fulfil emancipatory dreams of education and independence. However, the conditions of their lives and work oftentimes did not allow them to achieve praised self-determination. Governesses were able to get education (of varying quality), but it often did not lead to their independence, instead exposing them to different pitfalls. Eliza Orzeszkowa called them "morally and materially the poorest creatures in the world" (1893).

In this presentation, I will present the preliminary findings of my research in the following spheres:

• **Class** (relationships with employers and students, class tensions, unclear hierarchy and imbalance of cultural capital, social background of employers and employees, place of governess in the servants' structure).

• **Gender** (higher wages for male home tutors, "masculine" and "feminine" school subjects, governess profession as an insurance policy for impoverished spinsters, conflicts, frustrations, microaggressions).

I will use letters, diaries and other personal texts of governesses as my main research material.

94 - History of Modern Physics - 2

Room: **AY.2.107**

Chair: Helge Kragh

Bell's Theorem. A Scientometric Approach to History of Science

- Filippo Oberto

The history of Bell's theorem starts from the recognition of its key role in the debate on the foundations of quantum mechanics in the second half of the last century and it passes through the analysis of times and ways in which it spreads within the scientific community. This story can be partially reconstructed through the study of publications referring to the 1964 paper by J.S. Bell, "On the Einstein Podolski Rosen paradox". Starting from the empirical data on the citation trend concerning Bell's work, we reflect on the possibilities offered by scientometrics to construct effective visualizations of the scientific community, able to offer an overview of the structure of research groups. We focus our analysis on the links existing between these groups and we try to highlight the way in which "current of thoughts" within the scientific research are formed. In recent decades, the quantitative approach to the history of science has been used more often: one of the goals of the proposed work is to try to confirm the value of such an approach, pointing out how quantitative methods are capable of showing the intrinsically social character and the non-linearity of the research process. We used a variety of clustering algorithms based on the citational data mentioned above and a state-of-the-art technique for topic model. We believe that the combined use of these methods allows us to show when the importance of Bell's results has been recognized by the entire research community: in this way we are able to reconstruct the diffusion of Bell's theorem and to highlight the links it has with the most recent fields of research in quantum mechanics. We will demonstrate how a narrative of science built with quantitative methods allows to better explain specific characteristics of the history of Bell's theorem such as, for example, the role of experimental testing in building consensus around the theory or the long acceptance times of the theory by the scientific community.

The Promise of Science: Building International Scientific Cooperation in post-WWII Europe

- Luca Forgiarini

CERN (Centre Européen de la Recherche Nucléaire) was created in the early 1950's at around the same time as the first efforts of European integration. Typically, CERN's history is cast in light of the reconstruction efforts that followed WWII, which had greatly damaged European research infrastructure. A cooperative scientific venture such as CERN was to serve both the interests of individual participating nation states and the interests of the collective. Scholarship on the history of European scientific cooperation has emphasised its role in European integration (notably Krige and Guzzetti, 1995) and stressed the existence of a vision and political will driving this cooperation. However, this vision – of building Europe through scientific cooperation – remains largely unexplored from an academic point of view. In this paper, I explore the visions and expectations of the scientists and science administrators involved in the creation of CERN and the extent to which the latter can be seen as an implementation of a pacifist and internationalist – almost utopian – view of scientific practice. It has to be stressed that, due to a lack of science policy organisation in most European nations at the time, CERN's council enjoyed a large degree of autonomy in shaping its own course. Through an analysis of personal archival material of a core group of six scientists/administrators (Edoardo Amaldi, Pierre Auger, Henk Bannier, François de Rose, Gösta Funke, Jean Willems) and their relations to the wider nuclear physics community, I show the intentions with which the first large-scale international scientific cooperation was born.

Biased Narrative in the Scientific Literature: The Case of Gravitational Wave Science

- Livia Conti (Pablo Jose Barneo Gonzalez, Giuseppe Cabras, Univ Udine, Pierre Francois Cohadon, Davide Guerra, Edoardo Milotti, Jerome Novak, Agata Trovato & Andrea Virtuoso)

The first discovery of Gravitational Waves (GW) by the LIGO Scientific Collaboration and the Virgo Collaboration is a milestone of modern science: it occurred in 2015, a century after the first prediction by Einstein and after decades of worldwide experimental effort. After that, almost a hundred signals have been observed by the global network of the two Advanced LIGO detectors in the US and the Advanced Virgo detector in Italy. Such discoveries have attracted lot of attention and GW-based astrophysics and cosmology has become a fertile field of science. Although the LIGO and Virgo Collaborations have been acting as a single collaboration since 2007, co-authoring all of their achievements in gravitational-wave science, we report evidence that this is not always recognized in the wider scientific community where it is frequent to find that some results are attributed to LIGO alone. We interpret this biased narrative of the scientific developments as a kind of "Matthew effect" - first described by R.K. Merton in 1968 - applied in this case to large research organizations rather than individual scientists, grounding its appearance in the history of the LIGO and Virgo Collaborations. Finally, we report on the active approach we are pursuing to address this problem, with an eye on the growth of the worldwide gravitational-wave network which has recently been joined by KAGRA.

97 - Collections, Heritage, and Exhibitions

Room: **AW.1.126**

Chair: Erika Luciano

The 'Anatomy Museum' of the Faculty of Medicine of Lisbon (1825-1970): The Biography of an Invisible Collection

- Catarina Teixeira

In this paper, we will present the first results of the research project, intitled, "The Anatomy Museum of the Faculty of Medicine of Lisbon (1825-1970): a biography of an invisible collection." With its origins at the Royal School of Surgery (1825-1836) and the Medical-Surgical School of Lisbon (1836-1911), this scholar museum dedicated to the support of anatomy teaching of young medical-surgeons, was probably set during the last half of the nineteenth century at the medical school former location at Campo de Sant 'anna, in the surroundings of the Royal Hospital of São José. The project goals consist, primarily, in contributing to this museum historiography, including the reconstitution of its scientific collection's biography. Given the ethical, historical and scientific relevance of this heritage, we also intend to contribute for its long-term musealization and preservation. In this paper, we will try to stress the main networks, locally and internationally, the different actors involved and the scientific knowledge circulation, reflecting in what extent could contributed to the development of the anatomy teaching at the Medical School and the improvement of medical practices at national level, but also, for the development of the Anatomy Museum. Trough the analysis of different historical sources and scientific literature, among the survey of the museum anatomical specimens and instruments – that partly remains preserved nowadays at the Faculty of Medicine of Lisbon –, we will present the first outcomes and conclusions regarding the science politics behind this museum and its collections history.

Turin and the Industrial Revolution in the Mirror of the Exhibitions

- Marco Pozzi

In 1865 the capital of the new kingdom of Italy was moved from Turin to Florence. To reinvent the entire city of Turin, to redesign a new identity. Mayor Emanuele Luserna di Rorà announced an open call to foreign and national industrialists to open factories by investing in Turin. So, the Subalpine capital entered new scenarios, both on the productive and the cultural side.

With the 1884 Italian General Exhibition, Turin celebrated its industrial "revolution", a driving force for development and social innovation. The International Exhibitions that were held in Turin of the years 1898, 1911, 1928 will follow, up to the celebrations for the Centenary of the kingdom of Italy in 1961, became a lighthouse of the national economic miracle. The Exhibitions, as in the great European capitals, were a showcase where communicate to the people the scientific and industrial development: science changed society, society influenced scientific research. The "polytechnic" town suddenly became the melting pot of new innovation poles: automobile, aeronautics and cinema.

The scientific development and the new business community so forged the evolution of society as a whole. The critical evaluation of the narrative triumphs of the industrial exhibitions, based on the historical analysis of dedicated newspapers' articles reveals the popular impact of this change, and can explain success and decline of the subalpine capital.

In this phenomenon some protagonists, among science, politics and technology had a peculiar role: Quintino Sella, Galileo Ferraris and Vito Volterra.

The Provenance History of Fetuses of Nineteenth and Early Twentieth Century Amsterdam (1860-1930)

- Lisa Vanderheyden

The focus of this paper is on material culture, more specifically on medical collections and the way that they helped shape and institutionalize nineteenth and twentieth century medicine. The museum Vrolik, located in Amsterdam, holds a medical collection of human and non-human specimens collected throughout the nineteenth and twentieth century. The collection came about in order to aid the anatomy professors Gerard and Willem Vrolik with their education and was further expanded by various anatomists in the twentieth century.

A special interest goes out to the numerous fetuses that were added to the collection throughout the nineteenth and twentieth century. Little is known about how these specimens were collected and how these practices came about within Dutch (colonial) society. How were they perceived within society; which religious and legal frameworks surrounded these collecting practices? These material sources are worth researching both from a historical point of view (how medical collection contributed to the institutionalization of medicine) as well as from a museological point of view (as the collection is displayed to the public, the fetuses in particular that raise questions not only about accessibility but about morals and ethics surrounding human display).

Within the chain of events that brings these specimens into the collection, a shift in meaning takes place as the fetus enters different cultural spheres that make it take on different names: that of 'child', 'specimen', 'object', but also that of 'human' or 'ancestral remains'.

The Do's and Don'ts of Merging two Centenary Research Institutions: The Coimbra University Astronomical Observatory and the Geophysical Institute

- Pedro J. E. Casaleiro

Two centenary scientific research institutions, the Astronomical Observatory founded in 1772 and the Geophysical Institute founded in 1864, were merged into the Geophysical and Astronomical Observatory

of the University of Coimbra in 2013. During the two previous decades, both institutions entered a process of decline marked by staff reduction and lack of maintenance of their facilities and buildings. The activity of researchers and professors strayed to academic departments which resulted in reduction of research projects in these centres. The new automated scientific equipment required different needs and conditions. Libraries, which depended essentially on journal exchanges, stopped buying new material owing to its digital online availability.

This framework led to the appointment of a team to carry out a deep reflection on the future of the institutions. The outcome was the merge solution with the loss of the oldest space of the Geophysics Institute, resulting in the concentration of services and research in the Astronomical Observatory premises. After the decision, the management team was quickly reorganized and took over. As for material culture, due to the delay in finding a suitable destination to the centenary space of the geophysical institute, only recently has started to being brought together. Material culture of observatories is expressed by library collections, historical data archives and scientific instruments. This paper reflects on the work carried out in the last two years, establishing ethical management policies to bring the collections together, involving the development of procedures for conservation, cataloguing and disposal of objects, books, journals, and documents.

107 - History of Nuclear Science

Room: **H.2.215**

Chair: Roberto Lalli

Nuclear Encounters: Italian and German Physicists during WWII

- Adele La Rana

This contribution aims at giving a special perspective on the relationships between Italian and German nuclear scientists during WWII. It considers and analyzes for the first time two significant gatherings organized in Rome by the *Kaiser-Wilhelm Institut für Kunst- und Kulturgeschichte*: a lecture by Otto Hahn on nuclear fission, in March 1941, and one by Max Planck on the meaning and limits of the exact sciences, in April 1942. Both lectures were held at Palazzo Zuccari, formerly the seat of the prestigious *Bibliotheca Hertziana*, which had been recently renamed and restructured by the Hitler regime. A varied assortment of guests participated in these events: alongside Nazi political figures and authorities, and high exponents of the cultural life of the institute, Italian and German physicists such as Edoardo Amaldi, Gian Carlo Wick, Arnold Sommerfeld. Hitherto unpublished documents and letters allow to add meaningful pieces to the story of the interactions between Italian and German nuclear scientists during the world conflict, and to follow the evolution of these relationships in the post-war period, preluding to the role that physicists like Amaldi would play in the reorganization of science in Europe.

The Atomic Exhibition: Design and Politics

- Donatella Germanese

Is it legitimate to promote science overtly and a political party covertly?

My contribution discusses this question within the framework of the Cold War. It is based on the case studies of two traveling exhibitions designed by the same US office: the first covertly supported the general election campaign of the Italian Christian Democrats, while the second openly propagated the peaceful uses of atomic energy.

The traveling US atomic energy exhibition that started in Rome in 1954 was a popular technoscientific

show, clearly linked to the politics of President Eisenhower's "Atoms for Peace" initiative. It was part of a wave of US propagandistic exhibitions that deluged Western Europe from 1948 through the 1950s, designed to convince the populations of countries that had been recently at war with each other to cooperate to achieve common European institutions, standards of living, and military defense (NATO). The US Information Service acknowledged its authorship of the atomic exhibition on press releases and publications. This was not at all the case for a previous mobile exhibition that had been organized in support of the governing party for political reasons.
My paper is based on unpublished archival materials of different origins, as well as on relevant literature on Atoms for Peace, science diplomacy, hegemonic relations, and museum and architecture studies.

The Nuclear-Based Closed Carbon Cycle: A Missed Opportunity

- Benjamin Johnson

Our finite resources on Earth are not only defined by how we devise methods of using the raw materials available to us but also by whether we are able to implement those methods. However, historical perspective shows there is often a mismatch between technical ability and implementation of that ability. One method of establishing sustainable energy resources today is to close the carbon cycle in sectors that cannot be decarbonized (e.g. steel manufacturing). This technical ability resulted from fundamental advances in quantum and solid state physics over the first half of the nineteenth century as electrochemistry matured and displaced radiochemistry as the favored method of manufacturing non-fossil chemical compounds. At this point, electrochemical synthesis and oxidation began to challenge the 150 year dominance of the combustion of fossil fuels. With the first nuclear power stations going online in the 1950s, the cheap and plentiful source of electricity and heat needed to drive electrochemical fuel synthesis and close the carbon cycle was within reach. Yet implementation still escapes us. By the 1970s, social trends and policy decisions, many not evidence-based, had combined to slow the boom in nuclear power that had begun a decade earlier. Fossil resources were not phased out. Today, we face a transformation of both our energy sources and our energy infrastructure–an infrastructure that could have been in place decades ago. Were this the case, our challenge now would be to transition from nuclear to renewable energy instead of facing a global climate crisis caused by carbon emissions.

Crossing Boundaries: Science Diplomacy, Radioactive Isotopes, and the Emerging Field of Nuclear Medicine in Austria in the European Context (1950–1975)

- Johannes Mattes, Cécile Philippe & Sandra Klos

This paper offers novel insights into the impact of science diplomacy on transnational discipline-building processes in medicine. It examines formation of nuclear medicine as an integrative field of research, drawing not only from nuclear physics, chemistry, and radiology but also from international relations and national science policies during the Cold War in Europe.
The field gained traction not before the early 1950s when the first conference series on nuclear medicine were established. In Austria, newly created scholarship programs such as the Fulbright Program enabled physicians to catch up internationally, while colleagues from Eastern Europe were specifically invited to symposia organized here. The International Atomic Energy Agency standardized the medical use of radioisotopes and, through specialized missions, disseminated nuclear medicine technologies around the globe. Parallel to the 1974-founded European Nuclear Medicine Society with its headquarter in Vienna, dedicated nuclear medicine departments and university chairs emerged in most European countries.
We argue that nuclear medicine as a discipline emerged out of scientific-diplomatic practices that crossed boundaries in epistemic and socio-political ways and unified this diverse field of research and its clinical practice. We examine how physicians, working in Austria, and local research facilities took advantage of

the alleged neutrality associated with Austria in the State Treaty to bring themselves into play as bridge builders and scientific partners on both sides of the Iron Curtain. For this purpose, sources preserved in the Vienna and Innsbruck University Archives, the IAEA Archives, and the private holdings of individual nuclear physicians will be evaluated.

110 - History of Genetics
Room: **AW.1.121**

Chair: Denis Diagre-Vanderpelen

The Incredible Life of Gregor Mendel in the midst of the 1848 revolution (1849-1854)
- Christiane Nivet
G.J.Mendel entered the Brünn St Thomas monastery to become a monk and a teacher which suited abbot Napp head of the monastery. But in july 1848 he was made a curate for life (instead for three years as he thought of). With the help of five other monks he protested in a petition sent to the Constituant Assembly which was read in public at the end of january 1849.
In february 49 Mendel became extremly sick of an unknown contagious disease and for months, did not go out of the monastery. In september he was appointed supply teacher in Znaim (south Moravia) by Count Lazansky in charge of the Province but the position was not renewed for 50-51 : year which he spent in the monastery. From nov1851 to july1853 he studied two years at Viennese university. But again he spent august 53 to may 1854 idly inside the monastery .
In may 1854, he was finally appointed supply teacher for physics and natural history by Dr J.Auspitz, headmaster of the new Brünn secondary Modern School. For 12 years Mendel kept this position that had to be renewed each year by the Brünn teaching committee on Auspitz demand.
To explain this facts we propose several hypothesis developped in a paper published by the Japan Journal of Research (2022 vol 3 issue 1page 1-4) under the title:» Was G.J.Mendel imprisoned in 1849 by the order of the young Emperor François Joseph?»

Quantity and Quality: The Belgian Jesuit Valère Fallon and the Catholic Way to Eugenics
- Carlo Bovolo
The paper deals with the Catholic attitudes about the eugenics in the first half of the 20th century, focusing on the Belgian Jesuit Valère Fallon and his role in a Catholic network on eugenics, medicine, and demography. The eugenics studies and policies produced strong discussions and oppositions also within Catholics. Catholics opposed mostly towards the Nordic current of eugenics, spread in the Anglo-Saxon and German world, characterized by strong interventions (sterilization, abortion, birth-control) and by the idea of an artificial selection of the humankind. A Latin current of eugenics, however, based mostly education, prevention, and demographic growth, and spread in Catholic Countries, gained consideration from sector of the Catholic movement, like the Italian friar and physician Agostino Gemelli and Valère Fallon. Fallon (1875-1955), professor at the Catholic University of Leuven, alerted by demographic crisis in interwar Belgium, founded in 1921 the Ligue des familles nombreuses and became an active member of the Belgian Eugenic Society, in order to defend and rather support the growth, both in quantity and quality, of Belgian population. Rejecting the Nordic eugenics policies, he approved and embraced the Latin eugenics, stating that the Catholic morals represented the best and most effective eugenic principle. Through the interesting figure of Fallon, Jesuit and eugenicist, the paper intends to analyze the Catholic reception and approaches to eugenics and the construction of a network of Catholic scientists and intellectuals on eugenics, population, reproduction.

Between Rationality and Ideology: Challenging Historiographical Narratives on early 20th-century Eugenics

- Nicola Bertoldi

Current debates on the possible eugenic ramifications of genomics and modern reproductive medicine hinge upon the distinction between two kinds of eugenics. The first kind is the "old" or "historical", "authoritarian" eugenics of the 20th century, based upon "coercive state programs designed to promote social goods" and a fallaciously deterministic view of genetics. The second is the "new", "liberal" eugenics – centred on "individual free choice, pluralist values, and up-to-date scientific understanding of genetics and epigenetics" (Goering 2014) – that could gain currency in the 21st century. This paper aims precisely to question the historiographical narrative underlying the distinction between "historical" and "new" eugenics by highlighting the limitations of some fundamental categories that have structured this same narrative, namely the Foucauldian categories of "human technology" and "governmentality" (Rose 2006). Those categories imply that historical eugenics stripped such concepts as "population" and "fitness" of their scientific meaning to turn them into tools for rationally managing societies in the specific context of the global development of nation-states and welfare states from the 1900s to the 1940s. By comparing and contrasting two different branches of the early 20th-century eugenic movement, i.e. the British and the French one, we argue that historical eugenics possessed a properly scientific core, which biopolitical categories seem unsuitable to capture. For this reason, we suggest analysing historical eugenics through an alternative framework, which relies on the concept of "scientific ideology", forged by Georges Canguilhem (2009) in dialogue with how Karl Marx and Friedrich Engels had elucidated the notion of "political ideology".

Schizophrenia and Molecular Genetics: Mendelian Approaches of Mental Illness during the 1960s and 70s

- Apostolos K. Gerontas

That mental disorders "run into families" is well supposed among the general public, and schizophrenia holds a special position in the pop culture. Furthermore, also among exerts and for several decades, schizophrenia held a paradigmatic position among mental illnesses as an example of the "anti-Darwinian" survival and expression of defective traits. The current historiography of the genetics of schizophrenia, however, has significant gaps, while crucial elements of the most recent molecular era are scarcely documented. This paper –planned as a first of three on the history of molecular genetics and schizophrenia –offers a narrative of the theoretical debates concerning the genetics of schizophrenia before the immediate molecular genetics era and during its first period and the effects that these debates had on the initial experimental molecular-genetic approaches. The narrative follows the conflict between "biometricians" and "Mendelians" and the progressive integration of the two views towards a "polygenic" approach in schizophrenia in the mid-1960s, before discussing the reasons for the strong return of Mendelian attitudes in the beginnings of the molecular genetics era in the late 1970s –in the form of what is usually called the linkage analysis. The paper connects these theoretical debates with the chosen experimental setups –largely still undocumented in the historiography –and demonstrates the essential continuity between the linkage analysis approach and the earlier approach of Ernst Rüdin (1874-1952, most usually known as an infamous eugenicist and Nazi, but also generally recognized as the launcher of psychiatric genetics).

117 - Hybrid Knowledge

Room: **AY.2.108**

Chair: Cornelis J. Schilt

Scientists as Science Makers

- Albert Presas i Puig

The analysis of modern science-technological systems highlighted the need for individuals acting in different sub-systems to facilitate the exchange of information and to generate the dynamics that leads to new systems. By acting as interfaces, such individuals mediate between different elements in the system and draw a single interpretation from the different meanings generated by single components. The success of the system depends on the mediation abilities of such individuals, who could be called 'science makers.' Through their vision and technical and managerial abilities, mediators make science happen by generating networks of relationships around themselves. Despite its importance, this aspect in the performance of scientists has not been studied in a significant way. In this exposition I consider theories about leadership and institutional entrepreneurship (Fligstein; Thornton), as well as the concept of creativity (*Kreativität des Handelns*) proposed by Hans Joas to explain the creation of a new order of action, a new collective identity and a new semantic basis. Considering the biographies of Felix Klein and Homi Bhabha, this presentation focuses on scientists as generators of science systems. The questions I consider are:

- What kind of discourse did these scientists generate in order to establish themselves in different scientific, technical or policy areas?
- How did these scientists generate the network of relationships that fused science, technology, politics, industrial policy and economics and led to the development of large research complexes? What role was (self-)attributed to them in this function?
- What were the social and cultural dimensions of their actions?

Wooden Walls or Iron Plates? – Negotiating the Future of the British Fleet around 1860

- Albert Loran

The advent of iron-shipbuilding in Britain in the first half of the nineteenth century led to shipbuilding becoming an epistemologically contested ground. Engineers and shipbuilders had to solve the challenges posed by this material, and shipbuilders had to convince potential customers of the benefits of iron. Shipping companies soon recognised the opportunities of the new material but military and naval officers were more hesitant and pointed to unresolved flaws resulting from iron-shipbuilding, like compass deviation. They also connected their assessment of the shipbuilding material to political concerns, since shipbuilding in Britain was tied to questions of national security.

This paper examines the debate surrouding the introduction of iron ships into the fleet of the Royal Navy around 1860. In this debate, engineers, shipbuilders and naval officers each resorted to different epistemic values – theoretical sophistication, or practical experience – in order to underpin their authority, establish trust and discredit the claims of their opponents. For iron shipbuilders this meant to argue against centuries of experience in wooden shipbuilding. The debate was not conducted solely between experts and behind closed doors; naval journalists writing for an interested public also expressed their concerns, and experts discussed their views in periodicals with a wider readership. This paper examines the dispute between the military officer Howard Douglas and the naval architect John Scott Russell, taking place around 1860. While Douglas stressed the uncertainties of iron-shipbuilding, Russell

argued for a modern navy, built of iron. Their argument illustrates the multiple grounds of technological expertise and credibility.

Against All Odds: Bettencourt Faria's Astronomical Observatory

- *Vitor Bonifácio & Maria Almeida*

Born in Lisbon, in 1924, Carlos Mar Bettencourt Faria moved to Azores aged 6 and as a teenager to Madeira. The islands starlight skies fostering his lifelong interest in space. He also become a passionate radio amateur. In 1951 he moved to Angola to work on a diamond company as a sound recording technician, designer and surveyor.

For a driven individual an undeveloped country presents multiple opportunities. Realizing the lack of Portuguese expertise in the new field of radio astronomy Faria bought, in 1958, a plot of land near Luanda to install an observatory.

At a time when large scale scientific projects were directly or indirectly supported by governments funds were always scarce. Being, to all accounts, a charming and knowledgeable individual he managed to install several radio telescopes, a solar observatory, a state-of-the-art electronics laboratory and a satellite tracking facility. Support was obtained from a variety of private individuals, commercial companies and local institutions. For a lender of expensive equipment, the "just an individual" stigma led to the creation of the Astronomical Society of Angola.

The observatory become almost institutional when in 1971 a stipend was contemplated in the General Budget of the Province of Angola. The wind whirl of 1970's politics led to Faria's assassination in 1976 and to the destruction of his observatory.

Farias' endeavors provide a cautionary tale for individuals taking the role of government or well-endowed institutions while being simultaneously uplifting for all that was accomplished and his unequivocal enthusiasm for science.

Shipping Spectroscopes to Spain: The Diplomacy of an American Eclipse Expedition in 1870

- *Deborah A Kent*

After heroic efforts yielded disappointing results in North America during attempted observations of the total solar eclipse in 1860, US Coast Survey Superintendent Benjamin Peirce orchestrated a massive effort to obtain a better outcome during the total solar eclipse across North America in 1869. The US parties achieved spectroscopic observation of the previously unknown green coronal line K1474, as well as a vast collection of photographs. They hoped to capitalise further on this success with a trip to Spain to observe totality in 1870. The international destination required more extensive travel arrangements and, hence, greater expense. Careful political manoeuvres meant Peirce obtained passage and equipment for American observers and several international collaborators in 1870.

119 - History of Science Policy - 1
Room: **H.1.301**

Chair: Kenneth Bertrams

Policies of (Extra)Terrestrial Intelligence in the Soviet Republic of Armenia
- Gabriela Radulescu
In the second part of the 20th century, radio astronomers pursued the question whether there exists intelligent life in the Universe in a new way. Two conferences on extraterrestrial civilizations and communication with them were organised in the Soviet Republic of Armenia by the Soviet Academy of Sciences and the Soviet Armenian Academy of Sciences and Arts. Through these conferences, official Soviet policies on the pursuit of extraterrestrial intelligence as a scientific object were advanced. My research sets out to situate historically extraterrestrial intelligence in the context of Soviet Armenia, USSR and the relations between the two at the intersection of science and politics.
The study looks at the scientific-political relations between Armenia and Central Soviet authorities which underscored the organising of the conferences. It then draws attention to how Armenia played a role in the production of All-Soviet policies on extraterrestrial intelligence. Scientifical-political agreements in the case of Extraterrestrial Intelligence which were framed at and through these conferences show a specific merging between bottom-up initiatives and top-down decisions on science policies. As science and politics were closely tied in the pursuit of extraterrestrial intelligence through radio astronomy, these ties also reflected in the terrestrial realm. Political agreements between Soviet Russia and Soviet Armenia on how science best serves socially desired aims were also performed by scientists themselves, as they crossed the borders of different disciplines (between astronomy and history or philosophy, for example), or between science and politics.

The Life Cycle of Basic Research idea in Finnish Policymaking
- Antti Alaja
Despite recurrent criticisms basic research is profoundly entrenched in the vocabulary of science, technology, and innovation as well as university policy. Accordingly, research literature on basic research in processes of public policy is vast. Prior research has turned attention to the programmatic status that basic research attained after the World War II and during the emergence of science policy, its symbolic power in sustaining consensus over public research funding and its role as a statistical category by the Organisation for Economic Co-Operation and Development. Much of the literature seems to suggest that despite historical and cultural idiosyncrasies science policy discourses synchronized around basic and applied research in the OECD countries during the Cold War years. Yet research should devote more systematic attention on the changing status of basic research as an idea of public policy over time and how basic research has been politically used by elected politicians. Against this background this paper studies the life cycle of basic research as a programmatic idea in Finnish policymaking 1958-2009 and its uses in science, technology, and innovation policy debates. The research material consists of policy documents and selected parliamentary debates. The conceptual and analytical framework stems from historical and constructivist institutionalism.

Small-state Science Policy and Politics: Shaping Denmark, Science, and Technology in the 20th Century

- Kristian H. Nielsen & Casper Andersen

Traditionally, the historiography of science policy has focused on developments in larger science nations such as Great Britain, France, and the United States. Small states, however, may have specific concerns related to the allocation of resources and prioritization of scientific fields and activities that so far have escaped detailed historical scrutiny. Science policy is based on historically situated, political agreements on how science best serves socially desired aims, and different states will differ considerably in how such agreements are made and which social aims get priority.

We trace the development of science policy and the politics of science in Denmark in the course of the 20th century with particular attention to small-state nation building and the need to pursue international alliances. We argue that science policy-making in Denmark, initially sparked by international developments, followed a distinct path that set it apart from the development of science policy in large states such as Germany and Great Britain. This distinctiveness involved aligning scientific priorities with the demands of the emerging welfare state and Denmark's foreign affairs. For a small nation such as Denmark, internationally orientated science policy offered an attractive way of displaying a commitment to internationalism and neutrality in the volatile interwar period of big state politics. With advent of the Cold War, the Danish science policy became entangled with the politics of forging a strong, albeit small welfare state, based on close contacts to the United States and Western Europe, an open economy, scientific excellence, and technological innovation.

Science in a Free Sphere. The History of the High-Alpine Research Station Jungfraujoch, 1922-1952

- Leander Diener

The history of the high-alpine research station Jungfraujoch in Switzerland reflects scientific and (scientific) political Switzerland in the 20th century. Indeed, from the very beginning there was a tension between nationalist and internationalist interests. Originally, it was intended to be a national institution, but due to a lack of funds it relied on domestic and foreign funding. Disagreements between the Swiss Natural Research Society (S.N.G.), the Swiss Alpine Club (S.A.C.), the Federal Council and the Jungraujoch commission (set up specifically for the research station) delayed its construction and opening by almost ten years. It turned out that the conflicting aspirations were best united in the compromise of an international foundation established in 1930. The Kaiser Wilhelm Society was quickly won over, and other scientific societies such as the Royal Society or the Austrian Academy of Sciences followed in short order. Internationality proved to be a heavy cross to bear for scientific Switzerland on various levels: as a shadow over which the nationalist-minded S.N.G. had to jump after the constitution of the Jungfraujoch commission in 1922, as a political task for mediating and 'neutral' Swiss politicians which used the station as an foreign-policy tool in the 1930s, and as a background that made Swiss science policy and research funding strategies in the 1940s appear backward and potentially harmful. At the same time, the station's international organization pointed the way to the future of a post-World War II research policy not only in Switzerland but also in other European countries.

13:00-14.00 – Lunch & DHST meeting

Anniversary Meeting of the DHST Commission on Women and Gender in Science

Room: **H.1.309**

The anniversary meeting of the Commission on Women's and Gender Studies in HSTM, held during the ESHS2022 Conference in Brussels, is open to all.

At the 1981 Congress of the International Union in History and Philosophy of Science, Division of History of Science (both afterwards including "Technology"), held in Bucharest, Romania, participants of a three-day symposium on women in science mobilized to form a Commission on the History of Women in Science, Technology, and Medicine. During the Congress, the US and Hungarian delegates to the General Assembly proposed a joint resolution that, on approval (after some debate!), officially established the Commission. Two of the resolution's authors, Sally Gregory Kohlstedt and Margaret Walsh Rossiter (who also served as first president) will join virtually to offer their reflections and celebrate the Commission's 40th anniversary with us.

14:00-16:00 - Sessions

13 - Dissemination and Exchange of Scientific Knowledge in Early Modern Europe: Interactions among Scientific Communities and Religious Milieus

Room: **UB.2.147**

Organisers: Ivana Gambaro & Luís Miguel Carolino

Chair: Luca Guzzardi

Session Abstract:

The global image of the world that emerged from the Scientific Revolution was deeply indebted to the widespread exchange of scientific knowledge which took place in Europe from the mid-sixteenth century onwards. Representations of natural phenomena, collections of observational data, realistic or allegorical images of matter, richly illustrated scientific books, models of the terrestrial or celestial world, conjectures about the causes of natural phenomena, exchanged among European scholars, both secular and religious, shaped the birth of early modern science. In recent years, historians of science have concentrated on the contributions of eminent scholars belonging to religious orders, with particular attention to Jesuit mathematicians and astronomers. Still, much of their scientific activity deserves further study and analysis.

The purpose of this symposium is to examine the role of Jesuit networks in intellectual and scientific debates that involved members of scientific communities and religious and ecclesiastic milieus. In particular, it would be illuminating to analyze conceptions and visual representations of the celestial bodies and the cosmos and their impact on the most discussed topics at that time. To this end, we will gather a team of scholars from different countries, who will illustrate the peculiarities of scientific

communication (through books, letters, observations, maps, instruments etc.) that involved scholars often, but not always, belonging to the Society of Jesus in the period from the late sixteenth century to the end of the seventeenth century.

The Jesuit Network and the Reception of Tycho Brahe in Early Modern Portugal

- Luís Miguel Carolino

This paper explores the reception of Tycho Brahe's astronomical and cosmological theories in early Modern Portugal through focusing on a specific community of Jesuit scholars, a group of foreign mathematicians trained in different academic traditions from across Europe, who taught astronomy at the College of Saint Antão, Lisbon, during the first half of the seventeenth century. Recent scholarship has emphasized the role that the Jesuit polyvalent information network played in the circulation of knowledge in the early modern period. Analysis of the appropriation of Tycho Brahe's astronomical theories by the international community of Jesuit mathematicians active in Lisbon may also offer an appropriate occasion to analyze how the Jesuit network affected the production of knowledge process itself. I argue that, despite supporting the Tychonic geo-heliocentric system, which they explicitly conceived of as a 'compromise' between the ancient Ptolemy and the modern Copernicus, and making recourse to some of the cosmological ideas produced in Tycho's Protestant milieu, the Jesuits active in Lisbon strove to confine the authority of the Lutheran astronomer to the domain of mathematics. Philosophy was expected to remain the realm of Catholic orthodoxy. Accordingly, although accepting cosmological ideas put forward by Tycho Brahe and his associate Christoph Rothmann, the professors of the College of Santo Antão explicitly avoided recognizing the authorship of those ideas. This case shows that the cultural politics of the Counter-Reformation, embodied here in this network of international Jesuits, curbed the reception of Tycho Brahe within a Catholic environment, such as Portugal.

From Heaven to Earth: Contributions to Astronomy and Geography from Jesuit Networks in 17th Century

-Ivana Gambaro

If scientific societies were founded both in Paris and in London in the 1660s, collaborations between scholars had already been established in the previous century thanks also to the extensive networks of Jesuit colleges. The establishment of networks of correspondents to make simultaneous observations of celestial phenomena in different places, a sort of "remote collaboration", could bring benefits both for astronomy and for other disciplines. Indeed, observing the heavens in an age of such controversial astronomical debates could lead to outcomes far from the controversies over the true system of the world, which nevertheless remained very lively in the background. This project, sketched by some scholars at the beginning of the seventeenth century, later found the support of exponents of the Society of Jesus. As for lunar eclipses, the comparison of simultaneous observations and calculations made in one place with others from distant locations in Europe or in the Levant, could lead to establishing the true distance between places in term of longitudes, increasing the accuracy of the cartography and navigation safety. In the case of the transit of comets, the collection of observations from multiple locations allowed a better understanding of the phenomena. Furthermore, the increased amount of data stimulated the refinement of the instrumentation used. I will illustrate some fruitful collaborations that took place in Europe and were centered on Rome and Bologna involving well-known Jesuit scholars, and how these investigations influenced the acceptance of the new theories in the scientific circles, while in the background, in the religious milieus, the constraints of Aristotelian-Thomistic tradition remained.

A Network of Scientists on the Moon

-Valeria Zanini

Over the time, the lunar nomenclature presented by Giambattista Riccioli (1598-1671) in his *Almagestum novum* (1651) prevailed over contemporary proposals. His idea of associating the various lunar spots with the names of famous astronomers of ancient and modern times was successful, so much so that in 1932 the International Astronomical Union chose it as the starting point for the modern nomenclature of the Moon, and it is still used today. Furthermore, the lunar map of Riccioli is still important today because the names it contains give us indications with respect to the protagonists of astronomical science in the seventeenth century. In fact, Riccioli placed on the lunar surface only scholars of astronomy or genethliacal astrology who had offered an effective contribution to astronomical knowledge, then used by Riccioli himself to draw up the *Almagestum*. The scientists he placed on the Moon belong to all eras of human history, so they tell us both the historical and astronomical culture of the 17th century, and the network of relationships intertwined by Riccioli with his contemporaries. On the lunar surface we can recognize above all scholars and confreres (such as Grimaldi, Kircher, Moretus…) with which he had a close relation. In this contribution we will analyze which are the protagonists of the development of 17th century astronomy, based on the names celebrated by Riccioli on the Moon.

Hiding in Plain Sight: An Allegory of Catholic Crypto-Copernicanism in a 17th-Century Astronomical Frontispiece

-Daniel Stolzenberg

The engraved frontispiece of Andreas Cellarius's *Celestial Atlas* (Amsterdam, 1660) is a masterpiece of "intervisuality," drawing on symbolic motifs from the previous fifty years of astronomical publications. My paper offers a new interpretation of this famous image. Focusing on a significant paradox—the frontispiece depicts Copernicus, the founder of heliocentrism, pointing to an armillary sphere that symbolizes geocentric cosmology—I argue that the image is an allegory of Catholic and Protestant ways of discussing heliocentric astronomy. In particular, it juxtaposes Catholic "crypto-Copernicans," who privately adhered to heliocentrism while publicly avowing geocentrism, with Protestant astronomers who openly expressed their convictions. To support my argument, I refer to earlier 17th-century frontispieces and illustrated title pages that used symbolism and allegory to make polemical claims about astronomy and cosmology, especially with regards to the Copernican controversy, including works by Jesuit astronomers. Properly decoded, the frontispiece of the *Celestial Atlas* shines light on the new conditions of cross-confessional scholarly communication that emerged in the wake of the Peace of Westphalia.

32 - Science Studies between Science Policy and the Politics of Science: Perspectives across the Iron Curtain - 1

Room: **H.1.302**

Organisers: Jan Jakub Surman & Monika Wulz

Chair: Fabian Link

Session Abstract:

The field of science studies has a long connection to underscoring the practical and political side of scientific research, epitomised by British historian J.D. Bernal or the scholarly tradition of Polish "Science of Science" since the interwar period. In the 1960s this connection became more tuned toward an applied history of science, represented by scholars like Eugene Garfield or Gennady Dobrov. By then, science

studies' aim was to analyse sciences as much as to propose ways of their perfection, making "science of science" a meta-science. In the 1970s and 1980s sociologically oriented science studies developed a poststructural critique of scientific practices in terms of their military application and male dominance, becoming one of the driving forces behind changes at universities. Moreover, scholars used science studies' research to inform state science policy.

The papers in our section look at processes in which science studies have been practiced as an applied, practice-related discipline governing or advising state science policy or, on the contrary, critically engaging with the political dimensions of science. Such cases range from science studies tuning national science systems or laboratory innovation processes with the help of cybernetic-based science of science or of sociological science studies (in science policies in the USSR, Czechoslovakia, and the GDR) or the politicization and depoliticization of science studies in the context of contemporary political or scientific debates (the reception of Boris Hessen in the USSR, recombinant DNA, development politics since the 1970s) to science studies' role in integrating the GDR's science system into that of the FRG after 1989. In such endeavours, science studies actors presented themselves as both scholars and political actors, producing also enticing narratives about science's importance for modern society and contributing to the development of the idea of the 'knowledge society' on both sides of the Iron Curtain.

To Forgot Boris Hessen: Ghost of Externalism within Late Soviet History and Philosophy of Science

- Alexander Dmitriev

The reason why, unlike the West, Boris Hessen's achievements were virtually forgotten in the USSR even after his rehabilitation (1956), was that in the Soviet context his ideas concerning Isaac Newton lost the polemical sting they possessed when first formulated, which was directed against the old and "bourgeois" tradition of pure history of ideas (Mayer, Chivers). For the early Soviet context, Hessen's externalism was commonplace and ranged with a number of similar programs for studying the determination of knowledge (from Alexander Bogdanov to Timophey Rainov). But in general, the development of epistemology in the Soviet Union from "revolutionary" to "post-war" can be productively described as a movement "from utopia to ideology", to use Karl Mannheim's terms. As a result, to reconstruct the progress of scientific rationality, political factors and social interests were postulated but were not seriously studied in dynamics, as Hessen and his associates wanted. While the context of 1968 and the opposition to academic establishment were important for Western projects such as STS and for critical Marxism, what prevailed in the USSR was struggle for culture and for the reinstatement of "normal" (Western/global) standards of doing history of science against Zhdanov's simplistic scheme "*advanced science" vs "reactionary metaphysics*" (see Sheehan, Aronova). Furthermore, unlike in Western societies, the "closed nature" of the conflict in the public sphere in the USSR and the Eastern bloc countries also predetermined the **depoliticization** of the Soviet epistemology, history, and even the sociology of science and also synthetic '*naukovedenie*' between the 1950s and 1980s (from Bonifaty Kedrov's mainstream till Vladimir Bibler's semi-dissident circle).

"Applied History of Science:" Politicisation of History and the Paradigm Change in Cold War Central and Eastern Europe

- Jan Surman

The decade of the 1960s was for the Soviet history of science a period of blooming, and breakthrough. Once science and scholarship were hailed as productive forces by leading politicians, scholars had to change political slogans into research practice, a process which also involved historians.

In my talk I want to illustrate this change by focusing on Giennadyi Dobrov, a Kiev historian of science

turned cybernetics specialist and looking at the beginning of science management and scientometrics. I see Dobrov's internationally recognized work (a member of IIASA, a founding member of the journal Scientometrics, widely translated in pioneering books on naukoveddienie - the science of science) as connected to the reform of Soviet universities in the 1960s, in which, especially in the Caucasus and Central Asia, Dobrov played an important role. His activities are also a result of a paradigm shift in the (Soviet) history of science from one that is focused on the past to one focused on planning the future. Thus, the history told here should be one of "algorithmic rationality" in circulation, with, on one hand, a special sensitivity to Dobrov's "peripheral" position in the centrist Soviet science system – a position which fostered non-systemic innovation, not only in Dobrov's case. On the other hand, with attention to his approach to the history of science becoming the "applied history," I will locate it in Soviet and international discussions, comparing it with a.o. Derek de Solla Price, with whom Dobrov had intensive contacts.

Planning the Science – Serving the State: The Institute for the Planning of Science of the Czechoslovak Academy of Sciences 1962–1967

- *Michaela Šmidrkalová*

The Institute for the Planning of Science of the Czechoslovak Academy of Sciences (IPS CSAS) was founded in 1962, at the time when science studies turned more to the practical and applied orientation, on both sides of the Iron Curtain. This Institute was a successor of the Secretariat of the State Plan of Research that was established within the CSAS in 1956. The creation of the IPS CSAS – a special institute dedicated to the question of science planning and management – reflected the importance of science studies for Czechoslovak (not only science) policy in the 1960s. IPS CSAS, that existed until 1967, officially served as an "executive body of the Presidium of the CSAS for the planning of scientific research and a scientific department for the study of the social function of science". However, not all aspects of science studies were embodied in the activities of this Institute. Whereas the Institute focused especially on the practical problems connected with the development of science as planning, financing or governance, less-practical sub-disciplines of science studies such as philosophy or sociology of science were rather side-lined. This was in agreement with the traditional Czechoslovak practically oriented "science of science" the main aim of which was to serve the socialist state and to contribute to its economic growth.

Discussion

42 - Approximation, Precision and Error as Actors' Categories in the Alfonsine Astronomical Tradition

Room: **UB.4.228**

Organisers: Samuel Gessner & Sophie Serra

Chair: Matthieu Husson

Session Abstract:

Most historiography of ancient astronomers' achievements has pinpointed errors and approximations as a way to characterize them with respect to corrections and improved precision in the later course of history. In explicit contrast to this, the aim of this symposium is to ask how those astronomers themselves handled precision, approximation and error and how they thought about it. The case studies included in the symposium will address these problems on three levels.

The first looks at the Alfonsine astronomers' awareness of problems related to manuscript transmission. The historical actors knew that variability, ambiguities and information loss are inevitable in the context of a manuscript culture. Among the various means to mitigate these problems are, for example, the careful checking or recomputing of specific quantities (e.g. radices, differences).
The second level concerns the computational procedures. For one and the same object (e.g. eclipse), depending on their goals and on the context, astronomers would recur to different procedures with different intrinsic precision. Also, their use of what we name today "significant digit" in computation often shows good control of precision, but still awaits a convincing explanation for the modern historian. Diagrams and geometrical instruments may also be interpreted as a means of error control. They simultaneously come, due to the imperfection of any material instrument, with a related vocabulary of approximation, precision and errors inherent in vision and sense perception.
Finally, the symposium will discuss Alfonsine authors' epistemological stances on approximation, precision and errors. To what extent were they seen as inseparable from any human pursuit of truth? As a *Scientia Media* intermediate between mathematics and natural philosophy, was astronomy considered peculiar, regarding the approximation of truth? What meaning did numerical precision have for the Alfonsine astronomers ? What kind of reference to truth and its approximation were they interested in ?

Parisian Pre-Alfonsine Astronomy: Changing Times and Changing Values

- *Sophie Serra*

One of the most popular of the astronomical texts that flourished in Paris at the turn of the 13th and 14 th century is the commentary on the *Canon* of Arzachel by John of Sicily, known by its incipit « *Inter cetera veritatis philosophicae documenta* ». This text was composed during the 1290s in Paris, and we don't know much about its author. But this very lack of information, coupled with the compilation nature of the text), confers to it an important place in the study of the history of late medieval astronomy, since a lot of changes happened in Paris a few years later, giving birth to the « Parisian Alfonsine Astronomy ». As F.S. Pedersen has noted in his edition, the *Inter cetera veritatis* is « polished to an extent rarely seen in such works », thus offering an entry point into the pre-Alfonsine astronomers theoretical conception of astronomy and how they actually practised it at this turning point. It opens with a lengthy prologue where John paraphrases Ptolemy and Boethius in a vibrant defence of the preeminence of mathematical astronomy over the other theoretical sciences because of its unalterable objects, the precision of its results and the unmistakable nature of its conclusions. But at the same time, later in the text, John incorporates up-to-date values in computations, and often fails to discuss changes and revisions. Is it because he was not competent to assess the significance of such changes ? Because, as a compiler, he prefered to stay silent about numerical changes in order not to be forced to intervene on the textual parts ? Or because he did not want to address complex issues about truthfulness ?

Computing Latitudes as a Medieval Astronomer

- *Camille Bui*

With the Toledan Tables, two traditions for computing planetary latitudes were spread across western Europe from the 11th century onwards. They either derived from tables from al-Khwarizmi or from the zij of al-Battani, hence following the Ptolemaic model. With the emergence of the Alfonsine Tables, some scholars such as John Vimond (1320) or John of Murs (1321) reworked the latter type of tables, although they did not change its parameters. This idea of "revising" latitude tables was pursued later on by other astronomers, in particular by William Batecombe who wrote the Oxford Tables (1348), Prosdocimo de' Beldomandi (1424) and Giovanni Bianchini (1442). This has resulted in a variety of latitude tables whether they are more user-friendly, "extended" or use a double-entry system. Medieval astronomer were aware

that different types of tables existed and sometimes had several at their disposal. By putting ourselves in the shoes of these historical actors and adopting their method of calculation, we will compute latitudes using different tables. It will be interesting to compare the results obtained and to try to deduce the practises of a medieval astronomer. What did he expect when choosing one table over the other? Was he aware of the differences that could be generated? Was he choosing to be faster in his calculations at the expense of accuracy or was it the other way round? Did he take into account other elements that we might have disregarded?

The Challenge of Precision Measurements Using Astronomical Instruments: The Case of the Directorium

- *Nick Jacobson*

Sometime in the 1320s, a short treatise attributed to John of Lignères was written on an astronomical instrument called the *directorium* (preserved in BnF Latin 7295, ff. 78r-78v and elsewhere). The *directorium* enabled users to project a planet's ecliptic longitude onto the celestial equator without recourse to ascension tables. This was necessary for finding what were called directions between different planets or planetary aspects, which was an essential technique in astrological medicine during the late Middle Ages. What is more, the text specifies how the instrument was designed to measure a planet from its location in latitude as well as longitude. In this paper I will explain how the instrument was designed such that it could be sensitive to the precise measurements of a planet in latitude. I will also discuss criticisms of the instrument found in the commentary on al-Qabisi's *Introduction to Astrology* by John of Saxony who doubted its efficacy, and preferred using tables instead. I will consider under what conditions the instrument could have been useful to a practitioner, despite John of Saxony's objections. In doing so, I hope to think more broadly about the inclusion of astronomical instruments in canon texts, and under what circumstances the approximative results of an instrument could be preferred to the more precise results attainable with astronomical tables.

Geometrical Approximation and the Correct Planetary Positions on Early Astronomical Clocks

- *Samuel Gessner*

In his unsurpassed study of planetary mechanisms from 1980 E. Poulle notoriously scolded historical authors when their mechanical constructions deviated from the Ptolemaic models, or praised them when these perfectly complied. In contrast, in this paper I seek to adopt an agnostic position with regard to the makers' choices. What did they consider to be the true reference for the mechanical imitation of planetary motion? Was it the planetary positions observed in the sky? Was it Ptolemy's (or a different) geometrical constructions? Was it the numerical data within planetary tables? Documents addressing the makers' stances and the criteria for their choices are rare. A few writings relating to planetary clocks, however, show that approximation was seen as legitimate, not only by the commissioners and mechanics but also by the astronomers involved in their elaboration. By examining the various mechanical approaches to planetary motion together with some rare documents the paper tries to reconstruct a historical understanding of an "adequate" planetary mechanism.

53 - Service Science between Policy and Practice? The Role of Chemical Institutions and Experts - 1

Room: **AY.2.108**

Session organiser: Annette Lykknes & Carsten Reinhardt

Chair: Annette Lykknes

Session Abstract:

In her editorial address in connection with the 80th anniversary of the history of alchemy and chemistry journal, *Ambix* in 2017, then editor Jennifer M. Rampling suggested that the future of the history of chemistry is its ubiquity. Indeed, the so-called material turn in the history of science treats chemistry as a "less distinctive and more representative of scientific knowledge and practice as a whole" (Rampling, 2017). As Hasok Chang states in an article in the same issue of *Ambix*, the combination of the laboratory experience, the systematic theoretical thinking and the usefulness of such knowledge makes chemistry "an exemplary field of science" (Chang, 2017).

In this session, we would like to revisit both the theme of chemical sites or institutions, and that of the chemist as an expert – and the role of these institutions and experts in the development of science-based expertise relevant for decision-making at a political level, local or central. Much attention has been given to the chemistry laboratory but also to other sites of chemistry as places for material research and development (Morris, 2015; *Ambix* special issues, 2015). Likewise, the role of the chemist as an expert in such various sites of knowledge production has been investigated in *Ambix* (special issue 2020) and elsewhere. Specifically, the articulation of materials, production and governance is of particular relevance in the making of modern Europe as shown by Lissa Roberts and Simon Werrett in their 2018 edited volume *Compound Histories*.

The symposium consists of two slots. This is Part 1 of the symposium, which addresses the role of the chemical expert and German governmental research institutions during the NS period and the early Cold War.

Testing and Monitoring of Plastics, Paints and Rubber: The Department for Organic Chemistry of the German State Materials Testing Office 1924-1944

- *Malte Stöcken*

In the first period after the foundation of the German State Materials Testing Office (Staatliches Materialprüfungsamt; StMPA) in 1904, its chemistry department was concerned with the analysis of greases, oils, asphalt and, most importantly, metals. From the 1910s, it also began testing rubber and synthetic plastic to an increasing extent. While inorganic chemists were merged with metallurgists in one department after the First World War, an independent department for organic chemistry was formed, which I will discuss in this talk.

Because of the increasing use of plastics and paints as well as rubber, especially as a result of motorisation, their analysis and testing became an important field of activity of the StMPA in the 1920s. During the "Third Reich", the importance of the department increased even further. In the course of building up the sought-for autarky and the military state, organic materials that were not available in Germany were to be replaced by plastics, synthetic varnish and synthetic rubber, among other things. As I will show, the testing of these new materials was a central field of work for the Organic Materials Department. In addition, it will be shown that it also monitored and controlled the plastics industry to ensure the

production and use of high quality plastics. Thus, this department demonstrates the specifics of the StMPA as a research and testing institute and an authority with a monitoring and an economic control function at the same time.

"Such a Branch Could Be the Base for a Federal Chemical and Technical Institute": On the Development of the Institute for Chemical and Technical Research 1961

- *Elisabeth Kölmel*

In 1945 the Imperial-Chemical and Technical Institute (CTR) was declared an armament establishment by Allied decree due to its participation in the establishment of the National Socialist autarky and military state and was dissolved. Part of its staff was incorporated into the State Materials Testing Office Berlin-Dahlem (MPA, later BAM), in order to continue work on some of its former fields of expertise there, which, however, had to be restricted to the civilian sector.

Few months after the foundation of the new West-German army (Bundeswehr) in 1955, the Ministry of Defense approached BAM with the aim of resuming testing and research work in the military sector. The negotiations resulted in the establishment of the Institute for Chemical-Technical Research (CTI) in 1961, which was founded effectively as a new CTR especially for the needs of the Bundeswehr.

The presentation will concentrate on the personnel and institutional and ministerial continuities from the CTR to the CTI after 1945, with a special focus on the transfer of scientific knowledge by means of keeping experts in-house. In their function as departmental researchers, these experts played a key role in advising state institutions in their respective fields of expertise.

The efforts of the Ministry of Defense to resurrect a new CTR by mobilizing old knowledge resources, which were henceforth to be used again for political purposes, was accompanied by political debates, organizational complications, and secrecy strategies, all within a tightly meshed and trusted network of state, science, and industry.

The Testing of Military Materials for the German Democratic Republic and the Role of the Testing Laboratory for Organic-Technical Chemistry in Altenburg

- *Yvonne Elisabeth Schellhorn*

The talk deals with the German State Office for Material and Product Testing („Deutsches Amt für Material- und Warenprüfung" (DAMW)) of the GDR in the period from 1945 to 1964. The DAMW was involved in the production processes of goods in the Volkseigene Betriebe (VEB) and was authorised, among other things, to assess their quality.

On the one hand, it will be examined how the DAMW organised its research projects and which decision makers influenced them. A wide variety of actors, including those from the military sector, will be considered. On the other hand, the question of personnel continuities since the end of National Socialism will be answered.

The talk will present the DAMW's Testing Laboratory for Organic-Technical Chemistry, which existed in Altenburg from 1959 on. Chemical warfare substances were developed here under the strictest secrecy and material tests for military purposes were realised. For this purpose, munitions experts, chemists, materials testing engineers and former members of the „Nationale Volksarmee" (NVA) were employed. In 1968, a formalised, institutional connection to the NVA took place. Although the institute had committed itself through international contracts not to research or produce chemical warfare substances, it violated the agreements with its work. For this reason, senior staff vehemently denied the existence of the facility after the GDR ceased to exist following German unification in 1990.

Comment: Carsten Reinhardt

70 - Studying Mathematics in Göttingen: Becoming a Member of the International Community of Scientists

Room: **AW.1.120**

Organisers: Danuta Ciesielska & Martina Bečvářová

Chair: Annette Vogt

Session Abstract:

From the very beginning University of Göttingen was a unique place in the world, especially for those who were interested in exact sciences. In the first half of 19th century the most eminent mathematicians of that era Karl Gauß and Bernhard Riemann worked here. Gauß and Wilhelm Weber built a telegraph that was used for scientific study and communication between university sites. Later Felix Klein, David Hilbert, Woldemar Voigt became faculty members. Rather than presenting their results in mathematics or physics, we will discuss the role of the University of Göttingen in the 19th century and the first decades of the 20th century as an institution educating students from abroad. In the late 19th century it was the Mathematical Institute headed by Klein, that attracted students from all over the world. Young mathematicians, theoretical physicists and astronomers – women and men – come here to study. Many international careers of eminent mathematicians started or developed in Göttingen. Mathematicians of all European nations, along with Americans, Canadians, Chinese, Japanese and Hindu and others, arrived to Göttingen. Mathematical seminars, lectures and reading rooms sometimes sounded like a "Babel Tower", but people who came to Göttingen for mathematical studies spoke one common language – the language of mathematics, in fact spoken and written in German.

In a series of two talks we will present Americans studying mathematics and related sciences in Göttingen and getting their doctorates there, and juxtapose their experiences with those of their Polish counterparts. The next two talks will be dedicated to the Czech and Italian representatives among the large group of students of these nations in Göttingen. All these talks are parts of general research on the problem of national representations among math alumni of Georg August University.

American and Polish Students of Mathematics in Göttingen – Similarities and Differences, Part I: Americans from the US

- *Margaret Stawiska-Friedland*

The University of Göttingen attracted American students since 1815, although at first in small numbers and intermittently. Benjamin Apthorp Gould (1824–1896) was the first American to obtain a doctorate in exact sciences in Göttingen (1848, under the direction of Carl Friedrich Gauss). The first American student of mathematics, William Benjamin Smith (1850–1934), enrolled in Göttingen in 1876 and in 1879 he got a doctorate in mathematics here under Gauss. In 1878–1886 seven Americans studied mathematics, but this number was less than 5% of all American students of the University.

The number of students of mathematics increased significantly upon the arrival of Felix Klein as a professor in 1886. Some American students followed him from Leipzig: Mellen Woodman Haskell (1863–1948), Frank Nelson Cole (1861–1926). In 1886/1887 five Americans studied mathematics in Göttingen; in 1886–1889 there were 12 of them, and until WWI more than 120, among them 14 women. The Americans were the largest group of Klein's students until 1900. In the "mecca period" 1895–1914 mathematics was the most wanted discipline for students from the US but then the situation changed, Americans did not dominate the lectures rooms. In those days students from Russia flooded the city (many of them were Poles, but this is a different story).

The talk is based on the archival records from SUB Göttingen.

American and Polish Students of Mathematics in Göttingen – Similarities and differences, Part II: Poles

- Danuta Ciesielska

The University of Göttingen attracted Polish students even earlier than those from the US. The very first Pole who studied in Göttingen was a mathematician, Jan Śniadecki, who spent here some time in 1779. But Göttingen waited more than a century for the next Polish math students. From 1793 until 1918 Poland was partitioned and ruled by Austria, Prussia and Russia. Until 1870 there were very few opportunities for Poles to have an academic career and so they arrived to Göttingen very late. The first Polish student of mathematics enrolled in Göttingen in 1884; a future physicists, Joseph von Kowalski (1824–1896). Klein influenced him to start academic research. Kowalski was the first Pole who obtained a doctorate in exact sciences in Göttingen (1889, under W. Voigt). In 1884–1914 more than 80 Poles – women and men – studied mathematics at Georg-August University. Until 1922 five Poles obtain there PhD based on mathematical dissertations, and six passed exams in mathematics during the degree procedure. The number of the American and Polish students are similar but the stories are different. I will sketch a very difficult struggle of Polish mathematicians for the appropriate position in the international society and the role of in Göttingen alumni in this process.

The talk is based on the archival documents from SUB Göttingen and many Polish archives.

Jarník's Mathematical Studies in Göttingen

- Martina Bečvářová & Jindřich Bečvář

The most talented Czech and German mathematicians from the Czech lands or Czechoslovakia went abroad, thanks to government scholarships and funding. They travelled mainly to Germany, France, Italy or USA and looked there for better career, broadening the horizon of their knowledge and contacts with the best mathematical centres of Western Europe as well as possibility to publish their scientific works there. They usually came back after some time and worked as professors at prestigious secondary schools or universities and influenced the development of our mathematics.

Among the most notable archival documents from the interwar period, located in the Archive of the Academy of Sciences of the Czech Republic, are fourteen notebooks with notes written by Vojtěch Jarník (1897–1970, the later prominent Czech mathematician), during his studies at Göttingen in the years 1923–1925 and 1927–1928. The notebooks contain his notes from the famous mathematical lectures delivered by Emmy Noether (1882–1935), Karl Grandjot (1900–1979), Pavel Sergeevich Aleksandrov (1896–1982) and Bartel Leendert van der Waerden (1903–1996). Jarník's notebooks were discovered by Jindřich Bečvář in 2004 when he was preparing an extensive monograph on the life and work of Vladimír Kořínek (1899–1981), a Czech algebraist.

Mathematical Research between Italy and Germany: Fabio Conforto's Stay in Göttingen in 1932

- Maria Giulia Lugaresi

In this talk I will give an overview of the first mathematical research made by Fabio Conforto (1909-1954) soon after his degree in mathematics. Conforto graduated in pure mathematics from the University of Rome in July 1931. In his first research works he was strongly influenced by Vito Volterra, who had published the Theory of functionals and of integral and integro-differential equations (1930). Thanks to a scholarship from the C.N.R. during the academic year 1931-32 Conforto spent several months at the University of Göttingen, Germany. In Göttingen he could deepen his research in the field of geometry in spaces of continuous functions (the main topic of his degree dissertation) and in the field of mathematical

physics. Thanks to his bilingualism (Italian and German) Conforto could benefit from and be influenced by two different mathematical ways to think. In Göttingen he got in touch with some important German and Dutch mathematicians, such as Hermann Weyl (1885-1955), Gustav Herglotz (1881-1953), Bartel van der Waerden (1903-1996), Emmy Noether (1882-1935), Edmund Landau (1877-1938) and David Hilbert (1862-1943). In some letters written to Enrico Bompiani, preserved in the Bompiani Fund of the Accademia Nazionale delle Scienze in Rome, Conforto described the rather different approach to mathematics in Germany as compared to Italy. These letters are very useful in explaining the development of Conforto's future research, especially in the field of algebraic geometry

85 - Expertise and Experts

Room: **AW.1.121**

Chair: Jan Potters

The Making of Ignorance at Workplaces: The role of Experts in Ardystil Syndrome Case in late 20th-century Spain

- Sofiya Kamalova

This paper forms part of the research project "Invisible toxics: Chemistry, Agriculture and Public Health (1940 – 1990)" coordinated by José Ramón Bertomeu Sánchez (University of Valencia). In this paper I deal with the so-called "Ardystil case", an industrial poisoning due to plastic paints used for textile airbrushing. More than seventy people had alarming symptoms and six people died due to lung failure in 1992. The case reveals the precarious working conditions in these workshops: absence of safety and prevention measures and lack of adequate labour inspection, since the danger was not detected before the first death. Epidemiological and toxicological investigations were carried out and gave rise to a controversy on the causative agent of the Ardystil syndrome. There were gaps in the relevant scientific knowledge that created uncertainties about the cause of the disease and its treatment. In addition, the owners of the factory suggested alternative causes for the illness in order to prevent the making of causal connections between workplace and illness. This paper reviews these facts from the perspective of studies on the making of ignorance. The analysis of the medical debate is performed through academic publications and the public controversy is studied through the press together with documents that provide legal framework of the case. In addition, an interview with Gemma Mártinez, one of the workers was carried out to analyse the construction of ignorance at the workplace, the role of experts and approaches of popular epidemiology.

No Strings Attached: Participation Strategies of Soviet Experts in International Health Organizations

- Anastassiya Schacht

Soviet medical experts actively engaged with the international circulation of knowledge and technology throughout the Cold War decades, as they contributed to global disease eradication, Primary and Mental Health care. At the same time, their entanglement with networks of scientific knowledge in medicine is characteristic for its equally strong drive for seclusion. It served for permanent readiness to withdraw from organizations on political motifs, if necessary, even if such a walkout sabotaged one´s own networks of information and technology exchange.

In the offered talk, I analyze how the Soviet drive to participate in international expert organizations permanently entangled with agencies of academic policing – and political agendas proper. With the WHO and WPA as argumentative anchors, I reconstruct how Soviet politics intervened with genuinely scholarly

endeavors, forced scholars to overtake political roles and act, based on political rather than Public Health-related considerations. International scholars, too, were moved to take a stance and at part could profile as new mediators for ensuring the un-interrupted circulation of knowledge across the blocs and ideologies.

Thus, I provide an insight into ways how Soviet maneuvering shaped the institutional cultures, power constellations, and identity- and agency formation in International Public Health Organizations of the 20th century.

The 'Transnational Birth' of the Graduate Unemployment Expert: The Belgian Casus (1926-1948)

- Virgile Royen

Graduate unemployment has always been a concern for policymakers. From the 19th century and even before, Europe had been haunted by the fear of a rising "intellectual proletariat". Change first came with the Great Depression, when (self-proclaimed) experts started to study this phenomenon in a careful, systematic, "scientific" way. Our research shows, furthermore, that a transnational *epistemological community* of experts emerged in the 1930's in reaction to the graduate unemployment crisis. It reached its peak of influence in 1938, when it triggered the creation of the International Office of University Statistics.

The birth of these transnational networks of graduate unemployment experts can be seen as a Western, liberal answer to the exclusionary policies used by Eastern and Central European regimes against the overcrowding of universities. With the spectre of the antisemitic and misogynous -though effective- *numerus clausus* in Nazi Germany looming in the background, Western experts tried to dispassionate the public debate on graduate unemployment through objective statistics, ultimately aiming to programme graduate supply on the job market.

Our ambition is to link these transnational exchanges of ideas between experts to the effective decisions at the national level, so as to measure the actual impact they had on policymaking. We will focus on the Belgian casus, exploring how Jean Willems' University Foundation turned to become a leading centre for studies on graduate unemployment in Europe, as well as a decisive lobby room for Belgian university teachers eager to influence Belgian authorities in this matter.

The Political Dimensions of Mineralogy: Prussian Civil Servants in the Early 19th Century

- Angela Strauß

This proposed contribution examines the interconnections between science and politics on the basis of the expertise built up in the Prussian administration in the first third of the 19th century in the field of mining. After 1806, far-reaching reforms in administration and education had led to an increase in state influence on science and the circulation of knowledge. This also affected the production and reception of scientific and engineering knowledge. Following on from research on bureaucratisation (Andre Wakefield and Sebastian Felten) and on the development of the technical sciences (Ursula Klein), the contribution will examine whether state officials associated the development of mining and the relevant engineering and natural sciences with ideas about the order of state and society that went beyond their field of expertise.

The focus is on Karl von Raumer (1783-1865) and Heinrich von Dechen (1800-1889). Both were university professors and mining officials and can be regarded as protagonists of the development of mineralogy and geology in Prussia. They not only combined science and practice - by making systematic collections of material samples, mapping potential mining areas and advocating the latest mining techniques. They also displayed a creative will that clearly touched on the political field: von Dechen was involved in the "Verein zur Beförderung des Gewerbefleißes" (Association for the Promotion of Trade) and in 1841

presented a memorandum entitled "Die geognostische Landes-Untersuchung im Preußischen Staate" (National Geognostic Survey in the Prussian State), with which he laid the foundation for the founding of the Prussian Geological Survey. On the basis of von Raumer's and von Dechen's research reports and lecture notes, their scientific publications, travelogues and on the basis of administrative records, it will be examined to what extent they were able to translate their expertise and scientific networks into political and social influence.

86 - History of Mathematization of Nature and the Social World

Room: **AW.1.125**

Chair: Henk Kubbinga

The Emergence of the Technological Approach in the Mathematical School of Urbino

- Davide Pietrini & Foligno Antonella

During the Sixteenth century, the Dukedom of Urbino was a milieu where who translated ancient mathematical treatises could easily meet skilled artisans manufacturing precision instruments and having technical abilities. It is well-known that the restoration of these treatises facilitated the circulation of principles and theories from ancient mathematics among technicians.

As many scholars have already argued, modern science may be said to have originated when technical abilities were supported by the mathematical-theoretical approach, on which both Guidobaldo del Monte (1545-1607) and Bernardino Baldi (1553-1617), pupils of the mathematician and philologist Federico Commandino (1509-1575), were working on.

The aim of our contribution is to support the hypothesis that both these approaches to mechanics can be considered as forerunners of the technological approach, interpreted as the practical application of geometrical theorisation.

In particular, we will discuss the idea that in the *Mechanicorum Liber*, Del Monte accompanies the three-dimensional representation of machines with the geometrical schematization of their functioning. This double representation was meant to make the comprehension of the geometrical content simpler to technicians. Bernardino Baldi in his manuscript *Parere di Bernardino Baldi intorno al porto di Pesaro* shows that the geometrical approach can be useful when solving practical problems. According to these authors, mechanics is considered as a mixed discipline characterized by a harmonized union between its theoretical and empirical components. And this mathematical-theoretical aspect of mechanics conferred dignity to mechanics.

Colonialism, Certainty, and Utility of Mathematics in Practical Institutions in Spain (1500-1700)

- Helbert E. Velilla-Jiménez

This conference aims to present how the question about the certitude of mathematics (Quaestio de certitudine mathematicarum) in the Spanish context takes place in the framework of royal interests related to the promotion of cosmography, astronomical navigation, artillery, among others, in order to strengthen the Empire and the overseas navigation, as well as to defend the internal territory and the colonies. Both university and practical institutions were related to the royal directions focused on curricular designs that promoted the theoretical and practical training in utility fields to the crown. These local interests enabled a different reception about the problem of the certainty of mathematics with a particular emphasis on its utility. As a result, there was a creation of relevant manuscripts, books, and instruments used by professors, cosmographers, astronomers, and with the participation of pilots and

their practical experience.
I analyze practical institutions such as the *Casa de la Contratación* and the *Academia Real Mathematica* by considering the place of the utility of mathematics in astronomical, artillery, and cosmographical practices which were in service to the crown.
I expect to demonstrate that the existence of the Spanish Empire influenced the practices of mathematization and triggered theoretical debates on the role of mathematics in the apprehension of natural phenomena by Spanish mathematicians and natural philosophers. This means that the practices of mathematization are related to imperial categories.

Striking Parallels: Nation Building and Renewal of Mathematics in Risorgimento Italy and its Effects on Germany

- *Erwin Neuenschwander*

It is well known that the mathematical sciences stagnated in Italy in the 18th and first half of the 19th century. Only in the second half of the 19th century, did they flourish again in connection with the political unification of Italy. The younger Italian mathematicians and physicists (G. Battaglini, E. Beltrami, E. Betti, F. Brioschi, L. Cremona, etc.) participated enthusiastically in the wars of liberation (1848-59). Later they took over important political offices and tried to raise the level of mathematics and technical-scientific education in the newly founded state of Italy by creating and developing appropriate institutions (Politecnico di Milano, founded 1863; Scuola Normale Superiore di Pisa, remodelled 1862/63, etc.), and scientific journals (Annali 1850/58, Giornale di Matematiche 1863 etc). The Italian successes had a strong resonance in Germany, whose political unification came about ten years later. E.g., Johann August Grunert (1797-1872), in the literary reports of his Archive, reports in detail on the personnel and institutional changes in Italy and praises them in the highest tones. Similarly, Karl Weierstrass wrote to Casorati in 1867 that nowhere is the upswing of the sciences in Italy followed with more lively interest than here in Northern Germany and that the alliance in the political field should also be continued in the scientific one. The lecture outlines the political and socio-cultural background of this development and highlights the astonishing parallels between political and scientific endeavours that later on led to the Golden Age of Italian mathematics.

Urban Populations and Urban Problems in Quetelet's Population Statistics of the Mid-Nineteenth Century

- *Kaat Louckx*

In sociological research today, the city often acts as a strategic lens for the study of major macrosocial transformations. To date, much scholarly attention has been devoted to the contributions of early urban sociology to contemporary conceptions of the city. However, the role of urban statistics as an observer and (co)producer of 'social problems' in early modern nation-states has remained largely overlooked. This paper wants to fill this important gap in the scholarly literature by examining urban populations and urban problems in the Belgian Queteletian population statistics of the mid-nineteenth century. Specific attention will be devoted to the emergence of the city as an observation unit, the agency of the city as a data collector, and the definition of social problems through the lens of (urban) statistics. It is argued that the study of early urban representations is able to shed light on the history of public policy and politics, as urban data operated both as producers of knowledge and tools of governance.

91 - History of Psychiatry and Criminology

Room: **AY.2.107**

Chair: Kaat Wils

Finding Ruh in the Forebrain: Mazhar Osman and the Emerging Turkish Psychiatric Discourse

- Kutluğhan Soyubol

This paper examines the emergence of modern psychiatric discourse on mental health under the culturally Islamic yet radically secular context of the early Turkish republic (1920s-1950s). To do so, it focuses on the psychiatric publications of Mazhar Osman [Uzman] (1884-1951), the widely acknowledged "father" of modern Turkish psychiatry, and aims to genealogically trace Osman's scientific project of reconceptualizing issues such as psyche or soul, sanity and insanity during the early Turkish republic. The paper consequently traces Mazhar Osman's efforts to redefine the *ruh,* an Arabo-Turkish concept referring to both the metaphysical soul and the medicalized psyche, which Osman claimed to be hitherto defined simply within the realm of metaphysics, and thus left in the hands of religious healing. *Ruh*, according to Mazhar Osman, had to be liberated from this "backward" and socially "harmful" framework in which it was entrapped. Doing so included articulately and authoritatively defining the soul in a physiological manner within the framework of biological-descriptive psychiatry. Scrutinizing this normative and interventionist line of thought, this paper attempts to engage with the elusive and multilayered psy-scientific language (consisting of equivocal concepts such as *ruh*) that emerged in republican Turkey as a result of modern psychiatry's "empirical" interventions into the field of madness previously defined mainly by religion and indigenous traditions. The paper further sheds light on how the new descriptive-biological psychiatric knowledge propagated by Mazhar Osman in constitutive contradistinction to religious or traditional discourses on the soul, sanity and insanity reverberated with the Kemalist project of modern state building, and participated in the construction of "healthy" secular Turkish subjects under the early republican Turkish state.

Mere Belatedness or a Missing Phase? Plans for a Mental Asylum in Nineteenth-century Hungary

- Janka Kovács

The late eighteenth century and the early decades of the nineteenth century saw the rise of the (custodial) mental asylum in several countries of Europe, among them some regions of the Habsburg Monarchy (especially the Austrian and Bohemian territories). In Hungary, however, the first private and subsequently state-funded asylums were established well into the nineteenth century. Until then, the place of the mentally ill within the gradually evolving system of social and health care was subject to debate in the country, and even though health care and social reformers were actively seeking a solution and the first plans to establish a mental asylum for the Kingdom of Hungary emerged as early as the 1790s, the early history of Hungarian psychiatry is characterized by failed attempts and unrealized plans. The proposed presentation aims to explore how this debate unfolded in the early nineteenth century through plans that appeared either in print (in the press or as treatises and dissertation) or were submitted for further evaluation to administrative bodies responsible for health care. In doing so, I will follow a comparative approach, focusing both on the practices of the Habsburg Monarchy and the molders of its mental health care policy (e.g., Michael von Viszánik and Josef Gottfried von Riedel) and the role they played in shaping the plans for the Kingdom of Hungary. Furthermore, I will pay close attention to the transfers of knowledge between Western European practices (the adaptation of which was imperative for the contemporary medical community in Central Europe) and the difficult attempts at establishing a modern asylum in a country, where, as I will point out, a phase of institutional development – that of

custodial psychiatry – was merely left out.

Cholinesterase: Brain Enzymes and Human Experimentation in Post-war Britain

- Rebecca Watterson

Cholinesterase, a brain enzyme, became a major focus of psychiatric research and human experimentation in the UK during the 1950s. The discovery of the neurotransmitter, Acetylcholine, by Sir Henry Dale in 1913 led to a significant debate in neuroscience on whether communication between neurons (synaptic transmission) was chemical or electrical in nature. This propelled cholinesterase into a prominent position, with the National Institute of Medical Research supporting research efforts in the UK. The discovery of the Nazi development of nerve agents boosted post-war scientific interest in the enzyme. During the 1950s, Dr Stephen L. Sherwood, carried out experiments on psychiatric patients in Severalls Hospital, Essex, injecting the enzyme into patients brains.

Despite the contemporary importance of this research in the UK, it has received limited attention from historians. Little has been written on the enzyme research and there has been only fleeting mentions of cholinesterase experiments in the historiography of human experimentation and psychiatric research in the UK.

To fully understand the impacts of these experiments on scientific discovery and patient experience, we must understand why cholinesterase received such attention from the scientific and medical communities in the UK following World War Two.

Examining medical publications, correspondence, and oral testimonies, this paper constructs a narrative of cholinesterase and human experimentation in the UK during the 1950s. It suggests that closed networks of individuals, the resources afforded by access to academic and medical institutions, and military interest led to the eventual experimentation with cholinesterase on mentally ill patients via intraventricular injection.

An international legacy: the non- Italian winners of the Lombroso prize for the best work in criminal anthropology (1922-1936)

– Franco Capozzi

The aim of this paper is to investigate the legacy of Cesare Lombroso and the transnational and transatlantic impact of his criminological theories in the inter-war period. To this end, it analyses the work and professional trajectories of all the non-Italian recipients of the Lombroso prize. Established after Lombroso's death (1909) by his explicit testamentary will, the prize, which consisted of a bronze plaque and a small sum of money, was awarded by a committee to the best scientific work in the field of criminal anthropology. Between 1922 and 1936, the year of its first and last edition, the prize was awarded to seven scholars, five of whom were not Italian: Mariano Ruiz Funes (Spain, 1926); Israel Castellanos (Cuba, 1928); Leonidio Ribeiro (Brazil, 1933), Louis Vervaeck (Belgium, 1934); Olaf Kinberg (Sweden, 1936). This finding seems to suggest that after Lombroso’s death the most original and significant contributions to criminal anthropology came from outside Italy. In order to reconstruct the way in which Lombroso’s criminological theories circulated internationally after 1909, I will examine the content and references of the books awarded with the prize. Furthermore, by examining a wide array of medical and criminological journals of the time, I will reconstruct how the Lombroso prize winners’ works were judged by the international scientific community. Finally, drawing on archival sources, especially Gina Lombroso’s professional correspondence, I will examine the relationship between the Lombrosian school and the criminological schools of Cuba, Spain, Brazil, Belgium and Sweden. In so doing, the paper will shed new light on the international long-lasting influence of Cesare Lombroso.

92 - Colonies and Colonial Perspectives

Room: **H.2.215**

Chair: Raf de Bont

"Se ha Hecho la Esperiencia": Policies of Transplantation and Private Botanic Experiments in Spanish America (1492-1555)

- *Antoine Duranton*

From the first expedition in 1492 and during the first decades of the 16th century, the Spanish Crown actively attempted to transplant European flora in America through policies that combined financial incentives and precise instructions for selecting plants and soils. This State-funded effort by which experiments were directed from thousands of kilometers away, is quite unique for early Renaissance standards. In addition, individual initiatives were common. The planting of European flora was seen as a matter of prestige and power: many Spaniards were eager to present themselves as the first planter of certain species.

This paper aims to explore the reasons for this Spanish eagerness for botanic experimentations that motivated both official and individual actions at such an early date. Though the transplantation effort built on late medieval agronomical knowledge, it was mostly organized by individuals foreign to the Spanish "scientific" community: no agronomist, physician or apothecary was ever consulted. The first experiments even took place before the emergence of modern agronomical and natural history litterature in Spain, generally dated with Alonso de Herrera's book Obra de agricultura in 1513.

I will argue that despite its obivous links to botany, this policy was not aimed at the production of scientific knowledge. Rather, it was intertwined with the colonial enterprise and the willingness to impose Spanish sovereignty and Christianity in these newly-conquered lands. Cultivating the "good plants" was considered a key element for the successful rooting of the Catholic faith…

The Ottoman Bakteriyolojihane-i Şahane: A French Scientific Enclave?

- *Meriç Tanık*

The Imperial Bacteriology Institute or *Bakteriyolojihane-i Şahane*, established in 1893, played a pivotal role in the development of veterinary microbiology in the Ottoman Empire. This paper studies the network formed by the scientists employed in this institute. All key positions were filled by French scientists and Ottomans who had studied in French universities with a state scholarship. In this sense, the institute embodied a microcosm of francophone and francophile scientists, sharing common references and practices given their similar educational backgrounds. In this paper, I also explore the reasons why French scientists eagerly participated in this institute's research and teaching activities and why they readily responded to the Ottoman government's invitation. The archival documents I collected in France (such as those of the Pasteur Institute, the Ministry of Defence and the Ministry of Foreign Affairs) and in Turkey demonstrate how the institute came to be seen as a battlefield for scientific supremacy, the presence of French scientists being seen as crucial to counter other foreign presences in Istanbul like those of German and Austrian scientists. How this institute was referred to in French also sheds light to France's ambition to create a scientific sphere of influence. While the institute did not have any official ties with the Pasteur Institute and was entirely funded by the Ottoman government, the name given to the institute in French documents, *Institut Pasteur de Constantinople*, is at odds with the status of *Bakteriyolojihane-i Şahane* as an independent Ottoman institution and misrepresents it as one of the Pasteur Institute's overseas branches in the French colonial empire such as the *Institut Pasteur de Tunis.*

105 - History of Medicine

Room: **AW.1.126**

Chair: Monique Palma

The Modern "Soul"

- Otniel E. Dror

"The dark secret behind human nature used to be the upsurge of the animal—as in King Kong. The threat to man, his availability to dehumanization, lay in his own animality. Now the danger is understood as residing in man's ability to be turned into a machine." Susan Sontag, 1961

In this presentation, I argue that modern emotion partly substituted the old soul. I study a persistent modern conceptualization of emotion: emotion was that element which challenged the basic metaphor and model of the body-as-machine. Emotion was that dimension which challenged, sometimes disrupted, the attempts to formalize a mechanistic (and perhaps even digital/electronic) conception of the body. Put differently, in parallel with the mechanization of the body and of the emotions, emotion was conceptualized as a dimension of the body-as-machine which de-mechanized the machine. Emotion was thus, and persistently, a "vital" or "mystical" element in a mechanistic conception of the modern body.

In my presentation, I focus primarily on late-nineteenth and early-twentieth century physiology and medicine. During this period, emotion was already supposedly mechanized and internalized into the model of the body-as-machine. My major aim is to showcase how emotion was that aspect of the body and of the self which persistently rescued humanity from being conceptualized in terms of a machine. My presentation studies the wide scope of this conceptualization of emotion as the (modern Vitalistic) essence that distinguished sentient life from machines.

Maternal Bond and Healthy Child: Transnational Knowledge and its Application in one Country

- Katerina Liskova

In the early postwar years, ideas about the necessity of the mother's presence and care for the future health of her child became established. On the transnational level, the years 1951-2 marked a publication of a two-part report on "Maternal care and mental health" prepared for the World Health Organization (WHO) by the psychologist John Bowlby. WHO tasked Bowlby with mapping the fate of children in war-torn Europe. What he came up with was to highlight the absolute necessity of a warm, intimate connection between the mother and the child to develop so that children grow up to be mentally healthy. A decade later, the ideas about "emotional deprivation" of children became resonating in one country of the Eastern bloc: Czechoslovakia. There, developmental psychologists together with pediatricians warned against dire consequences awaiting children who spent their early years in institutional care. By 1963 when a Czechoslovak documentary "Children without love" was made, "institutional care" encompassed not only hospitals and orphanages but also nurseries and kindergartens.

Based on published expert writings (WHO) and scholarly monographs together with family policies (Czechoslovakia), I will analyze expert ideas about the importance of maternal care. I will show how the same recommendations emerged from different social situations (postwar child homelessness vs. socialist collectivized childcare) and produced divergent outcomes (changed practices of care in institutional settings vs. renewed focus on women-as-mothers, not workers). In particular, expert authority accentuating the mother and her irreplaceability inspired policy changes that led to the re-traditionalizing of gender ideas in socialist Czechoslovakia.

The Politics and Practice of the Molecularization of the Clinic in Precision Medicine

- Robert Meunier

The concept of biomedicalization describes a social reality and a historical shift. This shift has been characterized on various levels (Clarke et al. 2009): the reliance of medicine on the biological sciences and the technoscientific inventions it spawns, new forms of entanglements of medicine and economy, a focus on health improvement/risk management, new forms of distribution and consumption of information, new identities and social relations resulting from these developments, as well as new science policies regulating these aspects and new forms of expertise feeding back into politics. Even though it is acknowledged that biomedicine involves more than genetics/genomics, this aspect is prominent and highlighted through the notion of a 'molecular gaze', succeeding the clinical gaze developing around 1800 (Rose 2007). Today, molecular medicine operates in a more complex multi-omics data landscape, which involves metabolomics, metagenomics (microbiome), and exposome (nutrients, toxins).

In my talk, I will combine the analysis of contemporary clinical practice in 'precision medicine' based on participant observation in a large-scale clinical research consortium with a historical perspective on the impact of the recent proliferation of high-throughput technologies on clinical research and practice. These novel forms of data-intensive clinical practice are shaped by political agendas and economic interests and in this context often described as 'promissory' (Kenny et al. 2021). On the level of clinical practitioners, new social orders emerged, as exemplified in molecular tumor boards (Cambrosio et al. 2021). Regarding translational research and clinical practice, an assimilation of diagnosis and treatment can be observed.

116 - History of Earth Sciences

Room: **AY.2.114**

Chair: Jip van Besouw

The French *Bureau des Longitudes* and its Implications in the Renovation of International Geodesy (1917-1925)

- Martina Schiavon

After the First World War, geodesy was deeply reformed: firstly, as a scientific discipline, and secondarily as part of the renewed International Geodetic and Geophysical Union. Covering the period 1917–1925, my talk questions the historical signification of geodesy and its evolution from the point of view of the members of the Bureau des longitudes. Despite its technical name, this French institution created in 1795 (and still existing) worked as an international "*academy of astronomical sciences*": until 1932, it deserved as a place for collective expertise and an advisory committee in science and technical matters for French government. It included prestigious scientists, Navy and Artillery officers, and distinguished precision instrument-makers who took a leading part in various national and international projects such as the reestablishment of the international geodesic association from 1919. Taking as an archival source the minutes of the Bureau des longitudes and focusing on this small but very significant network of actors, my proposal is twofold: firstly, showing the strong involvement of its members into the administration of French sciences and technologies, and into the formal and informal exchanges which participated to the constitution of a renewed and selected post-war international geodetic community. Secondly, and more generally, relying on a specific and national context of actors and instruments who gravitate around this small academy, I want to encourage a more extensive and comprehensive study of post-war international relations and policy making of geodesy. To do this, I will sum up my recently published findings on the subject that I will expand upon to better explore the journey of a key player in my story, the French savant

and officer Georges Perrier (1872-1946).

The *Institut National de Géographie*: Politics, Science and Capitalism

- Colin Dupont

Despite a name with official connotation, the *Institut national de géographie*, established in 1882 in Brussels, was a private company. Key roles were played by Henry Merzbach and Théodore Falk-Fabian, two editors already involved in the maps trade with their *Librairie Muquardt*. With the *Institute*, they managed to rally prominent Belgian figures of the political, financial and editorial spheres and even Leopold II. These figures jumped on the bandwagon of geography, which was then at its "triumph". It is true that the discipline largely supported the colonisation of Congo. But it was also an ideal to be defended. The members of the Board, authors, shareholders, showed a genuine concern for the teaching of this science, its history and the “Belgian” achievements in the past.

This paper aims to lift the veil on the history of this company as an example of the interweaving of politics, science and capitalism in Belgium during the second half of the 19th century. It remained unclear on how Merzbach and Falk-Fabian managed to bring together such important stakeholders. What were the ambitions and purposes of the founders of the *Institut*? What were the networks that connected them? What discourse did they have in geography? These are some questions that will be explored through new archive material including the production of the institute and the papers left by some of the stakeholders. These reflections will take place while keeping in mind the contributions made by Jan Vandersmissen (*Koningen van de wereld*) and Felix Driver (*Geography militant*).

A New Approach to the Scientific Trajectory: Applying Cartography GIS and Digital Formalization to the Case Study of Scientist Alexandre Brongniart, 19th-century France.

- Mathieu Fernandez & Martine Mille

We propose to link scholarly biography and territory of the scholar; and to analyse the life course of Alexandre Brongniart (1770-1847), founding father of paleo-stratigraphy, in a graphic exploration. Territories are the breeding grounds of the scientific work, as the collection of samples links it back to his disciplines and the scholarly community.

From private sphere’s writings, we can accurately reconstruct the life of the scientist, from “center to peripheries”, representing trajectories (biographical, scientific, technical, tec.), graphically, with the Geographic Information System (GIS). A geolocation of scientific networks, such as the first stratified map of the Parisian basin (1811) appears as “center”, then his scholarly European network represents the “peripheries” (Mille & Fernandez, 2021)[5].

The method based on a longitudinal approach involves collecting the data of “items”, reducing to essential fields of research in a digital formalization of the pathway (history of science and technology, geography and mapping), strata by strata with cumulative links and effects. It reveals the coherence of Brongniart’s career, suggest a strong relationship between field practice and the formalization of a mapping tool. The essential sequences of the scientist pathway reveal a new proposal with this “digital Brongniart’s trajectory”.

[5] Martine Mille, Mathieu Fernandez, « L’apparition de la carte géologique et le territoire du savant. Trois échelles d’après les carnets d’Alexandre Brongniart (1786-1822) » ; “The Appearance of the Geological Map and the Scholar’s Territory. Three Scales According to Alexandre Brongniart’s Journals (1786-1822)”, *in:* Mauricette Fournier, Florence Troin, (dir.), *Cartographies en movement. Parcours sensibles. Narration et participation*, Clermont-Ferrand, Presses Universitaires Blaise Pascal, 2021, p. 53-74.

120 - History of Science Policy - 2
Room: **H.1.301**

Chair: Kenneth Bertrams

Historians Tackling "Societal Challenges": A History of EU Funding for Policy-oriented Historical Research

- Marie-Gabrielle Verbergt

Over the last two decades, policy-oriented historical research has become increasingly prominent, especially on the European level. In comparative terms, the EU probably is the largest sponsor of historical "targeted research" in the social sciences and humanities in Europe, having invested over 200 million euros in project subsidies for historical research since 1994. Though historians have from the nineteenth century on been acting as advisors, perhaps even "consultants", to policymakers and politicians, the launching of top-down calls for historical research by a supranational government may mark a new stage in this longer history of historians acting as experts. This paper explores the practice of doing history for policy-oriented purposes and probes what is, epistemically, at stake with the emergence and institutionalization of this new professional role for historians.

On the basis of ca. 100 projects sponsored by the EU for policy supporting historical research over a twenty-five year span, this paper specifically asks which ideas about valuable historical research and expertise underlie calls for policy-oriented historical research. It furthermore explores how those idea(ls) are put into action, and in what way(s) the practice of doing policy-oriented history may differ from conventional academic history? Drawing on the history and sociology of science, where ideas about 'regulatory science' (Jasanoff) and 'transscience' (Eyal) have been prominent, I argue that policy-oriented history is a practice different enough from fundamental historical research to merit our attention as a possible future field of specialization and professionalization for historians.

Science-policy-practice Memories: Oral Histories of Farming in Britain 1950-1990

- Paul Merchant

This paper uses 'life story' oral history interviews with farmers, advisers and scientists to explore relations between government policy and the production and application of agricultural science in Britain in the period 1950-1990. In accounts of their working lives on farms and in research stations, these interviewees often refer to a widespread acceptance of the need to increase agricultural productivity through the application of scientific and technical knowledge. Occasionally there are attempts to name particular Ministers of Agriculture or titles of White Papers, but what is more confidently recalled is a general feeling of official endorsement of efforts to increase yields by developing or using new varieties, agrochemicals, production systems and technologies. Farmers, scientists and advisers who started their careers in the 1950s and 1960s, I argue, acted within this paradigm without needing to interrogate it; making and using agricultural science was, they report, 'obviously' right for the country, and even for the world. For this reason, interviewees struggle in interviews to articulate their reasons and motives for having acted in one way rather than another, and show signs of what oral historians have termed 'discomposure' in reconciling past practice with a substantially different agricultural policy environment of the present.

Following the Money: An Alternative History of Research Policy in Post-war Sweden

- Per Lundin

According to the standard narrative, the formation of the Swedish research system was essentially a civilian affair. It took place during and after the Second World War, and it began with the establishment

of research councils. With the increased university budgets that soon followed, state-funded science became an academic concern. As explained by a policy analyst: 'In the 1950s, Sweden decided to concentrate its research resources in the universities … Public research was … dominated by the universities.' Research institutes – so common in other countries – remained a marginal phenomenon. The prevailing science policy of the era was to '[*l*]*et the researchers go about it as they see fit, and we will all harvest the results*.'

Analyses of the science policy discourse form the empirical base of these claims. However, if we take the economy of the research as our point of departure, it turns out that this storyline does not hold. In this paper, we perform an analysis of the historical national budgets and are thus able to reconstruct a research statistics for the post-war period.

Our data show, contrary to the standard narrative, that Swedish state-funded science was dominated by mission-oriented research, much of it military, and that it was conducted mainly by research institutes, state-owned companies and private industry, not the universities. In fact, the share of university research reached its nadir during the 1950s. By following the money, we are thus able to outline an alternative history of Swedish research policy.

"30 Percent Applications": Tensions on Government Planning and Scientific Autonomy in 1970s Laser Research in West Germany

- Johannes-Geert Hagmann

In 1976, the Federal Ministry of Research and Technology established a new type of institute within the Max Planck Society: a contract based research group projected to become the focal point of laser physics research in the Federal Republic of Germany. Despite a tense environment for funding, the initiative successfully built on the enthousiasm for laser fusion in Europe and elsewhere the world in view of the energy crisis of the 1970s. Quickly after its inception however, tensions between key actors arose on the share of application-oriented vs. fundamental research, the role of the ministry as a contractor and the planned scientific programme.

As a contribution to the Research Program for the History of the Max Planck Society (https://gmpg.mpiwg-berlin.mpg.de/en/), the present paper analyses the dynamics governing the creation of a research institute with emphasis on foundations at least partially in disguise: Initially highlighting utility, the Max Planck Society seized a political opportunity and subsequently reshifted its focus to emerging and explorative scientific field – quantum optics. It is argued that the Society's strategy focussing on research autonomy, the recruitment of scientific talent and thematic flexibility were key to the international success of the institution in areas of knowledge other than those foreseen by policy makers.

16:30-18:30 - Sessions

33 - Science Studies between Science Policy and the Politics of Science: Perspectives across the Iron Curtain - 2

Room: **H.1.302**

Organisers: Jan Jakub Surman & Monika Wulz

Chair: Doubravka Olšáková

Session Abstract:

The field of science studies has a long connection to underscoring the practical and political side of scientific research, epitomised by British historian J.D. Bernal or the scholarly tradition of Polish "Science of Science" since the interwar period. In the 1960s this connection became more tuned toward an applied history of science, represented by scholars like Eugene Garfield or Gennady Dobrov. By then, science studies' aim was to analyse sciences as much as to propose ways of their perfection, making "science of science" a meta-science. In the 1970s and 1980s sociologically oriented science studies developed a poststructural critique of scientific practices in terms of their military application and male dominance, becoming one of the driving forces behind changes at universities. Moreover, scholars used science studies' research to inform state science policy.

The papers in our section look at processes in which science studies have been practiced as an applied, practice-related discipline governing or advising state science policy or, on the contrary, critically engaging with the political dimensions of science. Such cases range from science studies tuning national science systems or laboratory innovation processes with the help of cybernetic-based science of science or of sociological science studies (in science policies in the USSR, Czechoslovakia, and the GDR) or the politicization and depoliticization of science studies in the context of contemporary political or scientific debates (the reception of Boris Hessen in the USSR, recombinant DNA, development politics since the 1970s) to science studies' role in integrating the GDR's science system into that of the FRG after 1989. In such endeavours, science studies actors presented themselves as both scholars and political actors, producing also enticing narratives about science's importance for modern society and contributing to the development of the idea of the 'knowledge society' on both sides of the Iron Curtain.

Laboratory Life in the GDR: Processes, Everyday and Progress in East German Science Studies (1970s/1980s)

- Friedrich Cain

The talk displays an episode from the Institute for Theory, History and Organisation of Science (*Institut für Theorie, Geschichte und Organisation der Wissenschaft*, ITW) at the Academy of Sciences of the German Democratic Republic. Founded in 1970, the institute was one of several new (or redesigned) institutions that expressed a global tendency to reflect on science's potential for policy making in the GDR. From the many research projects that were conducted at the ITW, the talk focuses on one research group that started working in the late 1970s. Its goal was to study a scientific process from its very beginning, which meant from the first idea (or a political task) to the final stage of its application, in this context the translation of scientific results into production. The specific case was the development of a chemical fertiliser, which had helped to increase the production of rye over the preceding years. As „Camposan" was considered a success in the GDR, it promised a better understanding of how policy goals, scientific

research and industry could be linked to prosper.Based on sources from Academy and industrial archives, the talk examines the Camposan-study and its epistemological contexts within GDR Science Studies. It will situate it as a historical approach to understanding scientific process (and progress) and contrast it with contemporary micrologies that incited the development of today's STS, such as Latour and Woolgar's *Laboratory Life* (1979).

Science, Technology, Development: The History of Science Studies in International Socialist Debate

- *Monika Wulz*

The role of science and technology in post-industrial transformations and in the changing economic relations after decolonization was a central topic in the 1970s and 80s on both sides of the iron curtain. In 1981, the conference "Socialism in the World", since 1977 held annually in the Dalmatian village of Cavtat, dedicated its discussions to the topic of "Socialism, Science, Technology, Development Strategies". The conference brought together more than 80 international speakers from destinations beyond bloc divides and from both Northern and Southern hemispheres: from philosophers such as Henri Lefebvre (Paris) or Blaženka Despot (Zagreb), sociologists János Farkas (Budapest) or Wolfgang Fritz and Frigga Haug (West Berlin), US American historians and science studies scholars Donna Haraway and Raymond Franklin, to scholars working on applied questions such as the role of science and technology in economic development (GDR economist Harry Nick) or in the demand for a "new international economic order" (Nigerian scholar Olajide Aluko). They discussed theoretical issues such as the ideological conditions of science or policy related questions regarding the interdependence between science, technology, and economy; moreover, contemporary concerns such as environment, energy and resources or the role of science and technology in political processes of democratization and participation. The paper takes the event of the 1981 conference as an entry point to discuss the role of science studies in those contemporary issues of both applied and political relevance within international socialist debates.

Sociology of Science, Science Policy, and the German Reunification: The Max Planck Institute for the Study of Societies Cologne and the Integration of the GDR System of Science into West Germany's Research System

- *Fabian Link*

This paper explores the social scientific expertise provided by the directors of the Max Planck Institute for the Study of Societies Cologne Renate Mayntz and Fritz W. Scharpf during the integration of GDR's science system into that of West Germany. Since the foundation of this institute in 1984, founding director Mayntz attached great importance to the sociology of science in her research program, which was supported by Scharpf who became co-director of this institute in 1986. The directors investigated large technical systems, which increasingly dominated the interaction between man and technology in late 20th century, and explored the West German system of university and non-university research with an institutionalist sociology of science-approach. In 1989, the West German Council of Science and the Humanities asked the Max Planck Society, among other institutions, to examine those persons in the GDR science system who might be able to work in West German research institutions. Because of her expertise and the research conducted at her institute, Mayntz appeared as one of the main experts regarding such questions. With great zeal, she and Scharpf engaged in this process and supported the foundation of new Max Planck Institutes composed of East and West German researchers. One of their recommendations was the foundation of the Max Planck Institute for the History of Science in 1993. The paper asks about the epistemic preconditions for Mayntz's and Scharpf's recommendations and investigates in particular their views of Leninist-Marxist approaches, which dominated the GDR's research system.

47 - Geoscience Spillover: The Applied Geosciences at the Intersection of the Oil Industry and Alternative Energy

Room: **AY.2.114**

Organiser: Odinn Melsted

Chair: Cyrus Mody

Session Abstract:

This symposium deals with the relationship of the oil industry and alternative energy development by focusing on the crucial role of applied geoscientific research. The contributors are all affiliated with the "Managing Scarcity and Sustainability" project at Maastricht University, which among other things explores the oil industry's engagement with alternative energy development in the 1970s. The papers build on recent scholarship by project members and collaborators concerning "oil spillovers" in the sense of innovation spillovers and direct/indirect as well as intended/unintended influence of the oil industry on other industries. Here the concept is refined to encompass "geoscience spillovers", which occurred primarily in the realm of the applied geosciences that link the oil industry and alternative energy development. Candida Sánchez Burmester presents geoscience spillovers in the case of oil and geothermal development in Greater California, where oil industry involvement, geoscientific expertise and petroleum exploration/exploitation technologies were essential for the utilization of geothermal steam for power production. Odinn Melsted likewise examines oil-geothermal spillovers via the geosciences in the case of Iceland. Unlike Mexico and California, where the oil and geothermal industries were co-located and had ties to the same institutions, Iceland had no oil industry. Even so, petroleum technologies and geoscientific expertise were crucial to Iceland's transition from oil to geothermal energy. Michiel Bron finally investigates the links between oil and nuclear energy, as geoscientific knowledge was indispensable for nuclear research, uranium exploration and energy use, and is crucial to understand the engagement of oil industry actors with nuclear energy. The three papers demonstrate that it is both useful and necessary to take into account the pivotal role of the oil industry and the applied geosciences when seeking to understand the history of alternative energy development, particularly concerning the reasons for oil industry engagement with geothermal and nuclear energy during the 1970s.

Geoscience Spillover: The Oil Industry and Geothermal Development in Greater California

- *Candida F. Sánchez Burmester*

In the 1960s and 1970s, the volcanically active region of Greater California in the U.S. and Mexico became a global hot spot of geothermal development. The three power plant complexes at the geothermal areas The Geysers, Imperial Valley and Cerro Prieto were among the cutting-edge projects at the time and still account for one fourth of the world's geothermal power capacity. An often overlooked but nonetheless crucial factor in this history were "spillovers" from the oil industry via the applied geosciences. While fundamentally different in end use, geothermal and hydrocarbon industries employ similar methods for exploring and extracting fluids and gases. In this paper, I analyze spillovers between oil and geothermal industries on both sides of (and across) the border. Those range from the direct involvement of oil companies in geothermal development (e.g. Pure Oil and Union Oil) to rather indirect influences with the exchange of geoscientists, independent drilling companies and research institutes between the industries. As I will argue, the geoscientific insights and technology transfers that helped understand, explore and exploit Greater California's geothermal potential – geophysical exploration techniques, oilwell rotary

drilling, well-logging and reservoir engineering – were primarily learned from the oil industry and the related fields of the applied geosciences. Geothermal development was therefore enabled by a strong presence of oil industries and associated research firms/institutes on both sides of the border. In doing so, this paper reveals an understudied link between fossil fuel and alternative energy industries and the pivotal role of the applied geosciences at their intersection.

Indirect Spillover: The Role of Petroleum Technologies in the Icelandic Transition from Oil to Geothermal Energy

- *Odinn Melsted*

Following the oil price shocks of the 1970s, the Icelandic government prioritized the development of geothermal hot water and steam resources to replace imported oil in heating and electricity production. As a result, geothermal energy provides for the heating of 9 out of 10 houses and almost one-third of the electricity supply today. What might not be an obvious but all the more essential part of this transition were *indirect* spillovers from the oil industry via the applied geosciences. In the case of Iceland, oil companies were never directly involved in geothermal development. The similarities in the essence, exploration and production of hydrocarbon and hydrothermal energy resources, however, permitted Icelandic geothermal engineers and geoscientists to learn from the older and more advanced oil industry. Adapted to the requirements of geothermal energy, petroleum technologies – ranging from geophysical and geochemical exploration techniques, oilwell rotary drilling rigs, to well-logging and reservoir engineering – greatly improved the knowledge of geothermal reservoirs, the success rate of well drilling and efficiency of hot water and steam extraction. Ironically, the Icelandic project that was framed as one of "eliminating oil" in the 1970s, was in reality one of applying petroleum technologies in a different context. By analyzing the role of petroleum technologies in the geothermal transition in Iceland – a country with no proven oil resources or oil industry presence – I seek to uncover the hitherto little examined links between the oil industry, the applied geosciences and alternative energy development far beyond the direct reach of the oil industry.

Radioactive Knowledge: The Role of Oil Geologists and Geophysicists in the Development of the Nuclear Industry

- *Michiel Bron*

The history of nuclear energy is a history of radioactive knowledge in geophysics and applied geology. From the Manhattan Project to managing nuclear reactors in the 1970s, geologists dominated the development of the nuclear industry. This paper focusses on the essential, and hitherto underexplored, role that the development of knowledge about radioactivity and the detection of natural radiation in geophysics and applied geology played in the world wide development of atomic energy. In this way, this paper shows that to build a global nuclear industry, knowledge from geophysics and geology was indispensable, and the involvement of the oil sector was not just a diversification project but may be better interpreted as a geoscience spillover. At the core of this paper are the stories of oil actors who operated at the intersection of geosciences and nuclear science, such as Sir Edward Crisp Bullard, Herman Schürmann, and Robbert van Erpers Roijaards. Through these case studies, this paper examines how knowledge of natural radiation moved from the laboratories of William Conrad Roentgen, Henri Becquerel and Marie and Pierre Curie to geophysicists and geologists in the oil sector who would then play an important role in the creation of the atomic bombs in the Manhattan Project, the first uranium mining in the United States and ultimately the establishment of a nuclear industry in France, Italy, the Netherlands and the United States.

Comment
- Thomas Brandt

54 - Service Science between Policy and Practice? The Role of Chemical Institutions and Experts - 2
Room: **AY.2.108**

Organisers: Annette Lykknes & Carsten Reinhardt

Chair: Annette Lykknes

Session Abstract:
In her editorial address in connection with the 80th anniversary of the history of alchemy and chemistry journal, *Ambix* in 2017, then editor Jennifer M. Rampling suggested that the future of the history of chemistry is its ubiquity. Indeed, the so-called material turn in the history of science treats chemistry as a "less distinctive and more representative of scientific knowledge and practice as a whole" (Rampling, 2017). As Hasok Chang states in an article in the same issue of *Ambix*, the combination of the laboratory experience, the systematic theoretical thinking and the usefulness of such knowledge makes chemistry "an exemplary field of science" (Chang, 2017).
In this session, we would like to revisit both the theme of chemical sites or institutions, and that of the chemist as an expert – and the role of these institutions and experts in the development of science-based expertise relevant for decision-making at a political level, local or central. Much attention has been given to the chemistry laboratory but also to other sites of chemistry as places for material research and development (Morris, 2015; *Ambix* special issues, 2015). Likewise, the role of the chemist as an expert in such various sites of knowledge production has been investigated in *Ambix* (special issue 2020) and elsewhere. Specifically, the articulation of materials, production and governance is of particular relevance in the making of modern Europe as shown by Lissa Roberts and Simon Werrett in their 2018 edited volume *Compound Histories*.
The symposium consists of two slots. This is Part 2 of the symposium, which addresses the role of the chemical expert in the early 19th century.

The Early History of Agricultural Chemistry or How Chemists Conquered the Soil: Chemical Training, Analysis, and Field-Lab-Research before and around 1800
- Christopher Halm
In the mid-18th century, several chemists served as consultants on agricultural issues and began to lecture on it. Their pedagogics in training prospective agrarian experts defined the causes of soil (in-)fertility and the work to improve it. Criticisms and shortages in manure and labour supply, however, soon urged them to focus on fertiliser substitutes: Soils and marl were quantitatively analysed for the first time and received a thoroughly chemical identity by the laboratory work. Yet, since analytical results seemed to be rather theoretical than practical and thus proved unsuitable to convince a broad agrarian audience, chemists who sought recognition had to leave the spatial confines of their laboratories and lecture halls and go into the fields: Around 1800 agronomists and chemists began to strategically align their analytical and practical

expertise. On the grounds of agricultural research stations chemists brought instruments and reagents from labs and classrooms onto greens and soils. They developed new devices and easy as well as reliable techniques to take, collect, and analyse soil samples. They also performed various trials with field plots and clay pots. In doing so, as this paper argues, agricultural chemists eventually transformed the arable field as a site of agricultural research defined by long-term practical experiences and observations into a space of rigorous agrochemical experimentation. This space, which is a *field-lab* hybrid, shall be up for discussion.

Trying to Return Europe to the Ancien Régime: Humphry Davy in Naples Chemically Recovering *Ancient Literature,1817-1820*

- Frank James

Following the destruction of Herculaneum in 79CE after the eruption of Vesuvius, the library, now known as the Villa dei Papiri, remained untouched until the 1750s. Then around 2000 papyri, all in a very fragile state, were excavated. It was hoped that these rolls might contain many of the lost works of antiquity and much effort was put into unrolling them and transcribing the contents. Their fragility meant that work was painfully slow and from 1800 the Prince of Wales (later the Prince Regent and then George IV) began taking a strong personal interest in speeding up the process, boosted when the King of the Two Sicilies presented a few rolls to him in 1817. One of the members of the commission established with the task of unrolling, was the leading English chemist Humphry Davy. Davy, fresh from his success with the miners' safety lamp, began to develop chemical methods of unrolling. These involved immersing the papyri in chlorine or iodine, heating gently to around 300°C and then carefully separating the papyri sheets. His work met with sufficient success for the Prince Regent to personally command Davy to go to Naples to continue his work with the full support of the British state. In Italy Davy antagonised many of the savants in the Naples Archaeological Museum with his arrogance. Furthermore, once texts began to be transcribed, the thorny issue arose of who owned the intellectual property so produced. The most interesting feature to this whole story was the (unsuccessful) attempt, combining modern science and ancient literature, to restore something of the pre-1789 norms of courtly exchange between Hanoverian London and Bourbon Naples.

Comment: Carsten Reinhardt

82 - Histories of Viruses and Vaccination

Room: **AW.1.126**

Chair: Monique Palma

Back to Normal – Reality or Dream? The Aftermath of the Spanish Flu in Real Data

-Tereza Kopecka

Introduction: The Spanish-flu pandemic is usually dated back to 1918-1920. Even before the income of Covid-19, we knew that the „additional" waves of the flu occurred over the first half of the 1920s, but we did not appreciate the meaning of this point. Personal experience with the pandemic has changed our perception of the problem.

Research questions: How did the Spanish flu last in the Czech lands? Who were the most and the least affected groups of the population?

Resources and methods: The primary role has the catholic death register of the General hospital in Prague, deposited and digitalized by the Prague City Archives, covering the period 1910-1925; other sources are the statistical sourcebooks of the Czech kingdom and Czechoslovak republic, and official reports of the health situation in Prague. These big data were extracted to MS Excel, classified by demographical methods, and using the revised Goldthorpe class scheme.
Results: The Spanish flu did not end with the year 1920; a significantly increased number of deaths from acute respiratory illnesses/sepsis was evident during the following years. The most affected group was young people, but it is uneasy to describe gender differences due to the accumulation of gender-specific phenomena. Extrapolation of the data helps estimate the death toll in the Czech lands.
Conclusion: The widespread assumption that a virgin-soil pandemic might end in one or two years is improbable; it is rational to expect that the „way back to normal“ will last longer also in the covid-19 pandemic.

Elites or Immigrants: Introduction of Smallpox Inoculation to Europe

- *Karel Černý*

This paper revisits history of early inoculation against smallpox, also known as variolation, in Europe. Frequently presented narrative about introduction of this anti-epidemic measure claims that variolation was initially practiced during the 17th century by Christian minorities in the territory of the Ottoman Empire. At the turn of the century, Europeans dealing with the Empire became aware of the procedure and first individuals began to use it to their advantage.
There is an often cited case of lady Mary Wortley Montagu, wife of British ambassador to the Sublime Porte, who let her daughter to be inoculated in London in 1721. This event is a well known affair in the history of European medicine, establishing England as the place where inoculation was first practiced successfuly and also firmly associating the procedure with the world of well educated upper strata of the society.
This paper will present a different perspective based on a source, which shows that the earliest European inoculations did not happen in England and they were not mediated through the wealthy and powerful. It suggests that the history of early inoculations has also involved individuals from less prominent classes particularly immigrants from the East and possibly also eastern merchants operating in various European trading hubs.

Containing the Uncontainable: the Pharmakon of Prevention in Vaccination Epistemologies Across Science, Ecology & Public Health Policy

- *Sofia Varino*

My paper delineates a genealogy of scientific knowledge and public policy by situating the development of Covid-19 vaccines as preventative measures in the context of climate change. Focusing on historical and epistemological issues of justice, intellectual property, and the limits of knowledge in the development and implementation of Covid vaccination programs, I consider Covid vaccines in relation to the probable nonhuman origin of the novel coronavirus and cross-species transmission, bringing to the fore concerns about rapid species extinction, deforestation, and habitat loss. Methodologically, I deploy the classical concept of the *pharmakon* to analyze the myriad safety and security discourses galvanized around Covid vaccines, especially the ambivalent function of any remedy as potentially containing both harmful and beneficial effects. I seek to demonstrate how the development of Covid vaccines and vaccination protocols encapsulates the inherent tensions among scientific research, clinical practice, and public health policy; how science, nature, and society shape and unsettle one another; and how social groups and epistemological communities generate and circulate knowledge for their own specific

purposes. I thus approach the history of vaccines as biotechnological interventions that exemplify the plasticity of bodies as ecosystems, as well as the uncertainty at the core of biomedical knowledge production. By engaging with the realm of the viral itself as a *pharmakon* of sorts, my paper shows how virions have functioned across environmental history as key agents for the development of conditions amenable for multicellular (non/human) life to flourish. Throughout, I contend that considering the ecological dimensions of the Covid pandemic is crucial for detecting and countering future pandemics in the age of the Anthropocene.

83 - Intercultural Circulation of Knowledge

Room: **H.2.215**

Chair: Karine Chemla

The Rekhāgaṇita, Sanskrit Translation of Euclid's Elements: I. Definitions, Axioms and Common Notions

- Jean Michel Delire

It is well known that the *Elements* were composed in the 3th century BC by an enigmatic scholar, Euclid, or by several scholars working at the Museion of Alexandria. Commented, augmented, criticized, the *Elements* remained nevertheless the basis of mathematics lear-ning, even though this discipline constantly got enriched by new discoveries. Though well informed about these developments, numerous scholars of different times and places remained fascinated by the *Elements* and translated them. Hence there exist translations into dozens of languages, notably several Arabo-Persian renderings, and even a Chinese version of the *Elements*. Interestingly, the Rāja-astronomer Jai Singh II (1688-1743) of Jaipur had Ptolemy's *Alma-gest* and Euclid's *Elements* translated for him from Persian and Arabic into Sanskrit. My aim, in this lecture, is to analyze how the *Taḥrīr kitāb uṣūl al-handasa* of Naṣīr ad-Dīn aṭ-Ṭūsī, the last Arabic 'translation' of the *Elements,* has been rendered in the *Rekhāgaṇita* of Jagannātha Saṃrāṭ, the alleged translation into Sanskrit of Naṣīr ad-Dīn's *Taḥrīr*. In that purpose, I will especially focus the beginning of the first book : Definitions, Axioms and Common notions, and on the organization of these important prolegomena in both texts.

Soils, Stars and Statecraft: Cosmological Conceptions of Agriculture in China and Europe, ca. 1600-1789

- Gianamar Giovannetti-Singh

In the early seventeenth century, as the Ming Empire was facing a series of crises attributed to Calamities from Heaven, the Christian scholar-official Xu Guangqi composed several texts that came to constitute the *Nongzheng quanshu*. This agricultural treatise was as much a tool with which the state could instil social order as it was an investigation into the nature and utility of the soil and cultivation. The political cosmology that shaped Xu's moral meteorology maintained that the actions of the emperor and, to a lesser extent, his subjects, affected the balance of the cosmic forces of *yin* and *yang*, and generated different kinds of *qi* that materially altered the relationship between Heaven and the earth. These morally influenced metaphysical transformations in Heaven affected terrestrial meteorology, thus impacting crop yields and, accordingly, were taken to play a significant role in fomenting anti-state sentiment, weakening a dynasty's Mandate of Heaven. Through Xu's membership of Jesuit social networks, accounts of Chinese agriculture and its associated cosmology reached Europe, whence they were appropriated by eighteenth-century Physiocrats. I argue that these European agrarian reformists were not only influenced by China's agricultural policies and bureaucratic-administrative structures, but that they sought to appropriate a

broader Chinese political cosmology, including its conception of moral meteorology and its implications for the monarch's role in society. The Physiocrats seized upon Chinese agriculture as the way out of Europe's eighteenth-century grain shortages, and Chinese cosmology as the means to ensure the transformation in social relations necessary to enable such agrarian reform.

British Interest in Japan Revealed by the Reproduced Copy from Daikokuya Kōdayū's Map of Japan Made in Russia in 1793

- Yuko Takigawa

The first Russian embassy to Japan was sent by Catherine II to Ezo (the previous name for the Japanese island known today as Hokkaido) in 1792, under the pretext of repatriating Daikokuya Kōdayū, a famous shipwrecked merchant and the master of a ship. Adam Laxman was commissioned as the first Russian envoy to Japan, although the Russian negotiations with Japan failed.

During his stay in Russia, Kōdayū is known to have made several copies of a map of Japan based on a printed map in a book he had saved from the shipwreck. Seven copies in his hand have been reported in libraries and archives in Germany, Russia and Estonia. A diplomatic report in the National Archives at Kew shows that the British Ambassador in St. Petersburg sent a precisely reproduced copy to the British Foreign Secretary. Moreover, further investigation of the catalogues has led to the discovery of the precisely reproduced copy among the Grenville Collection in the Caird Library, Greenwich.

The Greenwich copy is evaluated in comparison with the known copies by Kōdayū. Its significance is considered in relation to two points: first, the circulation of contemporary Japanese charts and nautical knowledge of Japan in Britain and Europe; and second, British and Russian interests in the Far East from political and economic perspectives. The existence of the Greewich copy is evidence of competition between the empires of Britain and Russia, to gain entrance to the Far East during that period.

87 – Science (based) Policies and the Public Perception of Science

Room: **UB.2.147**

Chair: Daria Drozdova

Public Assessment of Water Quality for Domestic and Manufacturing Purposes: The Water Hardness Tests in the Mid-19th Century

- Marco Taddia

In chemical terms, by total water hardness we mean the concentration of dissolved calcium and magnesium salts, conventionally expressed in degrees. The calcium and magnesium content in water for domestic and manufacturing use is important not only for drinking water but because hard water forms incrustations and progressively can obstruct tubes where hot water should pass. Nowadays hardness is measured by complexometric titration using EDTA (ethylenediaminetetraacetic acid), synthesized by the Austrian chemist Ferdinand Münz (1888-1969) in 1935. To provide approximate results that are satisfactory for most purposes, a less precise method based on soap-test is still used. This was patented in 1841 by the Scottish Thomas Clark (1801-1867). The reliability of the soap test was recognized by the local Commissioners of Woods and Forests who required for the water supply of a municipality: " A degree of hardness with reference to the tests and scale of Dr. Clark." He added a soap alcoholic solution of known concentration to a fixed volume of water until a lather be produced of sufficient consistence remained all over the water for five minutes. An improved version of Clark's method was published in

1855 by two French scientists: Antoin F. Boutron-Charliard (1796-1879) and Felix H. Boudet (1806-1878), members of the Public Hygiene and Health Council. The famous engineer Eugène Belgrand (1810-1878) employed their method to study waters of the Seine Basin. Four points will be discussed in this communication: 1) the historical background of water hardness measurement; 2) the Boutron-Boudet hydrotimetric method; 3) the results achieved by Belgrand (1854); 4) the debate on hardness and quality of drinking water (Paris, 1870).

The Role of Analytical Chemistry in European Science-based Policies: The Emergence of Portuguese Food Regulations (1875-1905)

- *José Ferraz-Caetano*

Driven by European scientific powerhouses, the social popularization of Food Regulation gained notoriety in Europe in the second half of the nineteenth century. Recent studies highlight how the emergence of Analytical Chemistry, a new discipline that personified the popularization of chemistry movements, was a vital contributor in Food Safety Regulations. But some of these crucial elements in Science-driven policies can be traced back to a peripheral European country. In Portugal, some of them can be found in the enhancements and new methodologies of Analytical Chemistry, led by its chemists, who came to influence the legislative trends in Food Regulation. Not only was this a novel perspective in Portugal, but it also contributed decisively to the "tremendous evolution" recognised by their European peers.

In this communication, we reveal how nineteenth-century Portuguese chemistry played a pivotal role in popularizing Food Regulation policies. Through novel documentation, we demonstrate how the pioneering Portuguese Science-based policies came in fruition towards Food Regulation normatives. We also highlight the role of Portuguese chemists on developing high-end techniques for the enhancement of Food Safety. How did these scientists in a peripheral educational pole, came to amass scientific capital and the prestige that enabled them to raise the role of science on European public policies? Through novel arguments on the historical discussion of legal definition of scientific food standards, a recent hot-topic in the contemporary debate on building scientific knowledge, we aim to cast a discussion on the limits of usability of chemistry in the inception of science-based policies.

Natural History Societies as Platforms for Citizen Science in the 19th Century Russia

- *Galina Krivosheina*

Citizen science is a relatively new term which has flourished over recent decades. Numerous works by researchers in science and technology studies as well as scientists involved in the citizen science projects focus on epistemological and social aspects of this multifarious concept, speculations on its possible role in future development of science, various methodological and ethical problems of citizen science project management. At the same time historical aspects of the problem seem to be insufficiently studied and deserve more close attention, especially from the point of view of their national specificity. The present paper deals with the history of the 19th century Russian natural history societies as the platforms for interaction between amateur and professional naturalists and as means of involvement of lay public into scientific projects – the task all the more difficult since well into the end of the 19th century it was considered that Russian people has no interest in scientific ideas. Drawing on the example of two Moscow societies – the Moscow Society of Naturalists and Society of Friends of Natural Science, Anthropology, and Ethnography – I'll show how they developed their public projects of geological, entomological, anthropological, and ethnographic research of the territory of the Russian Empire and what methods they used to proliferate science literacy among lay public and to attract hundreds of people to participate in these projects.

Talking about the History of Citizen Science in Portugal: The Volunteer Involvement in Biological Recording

- Cristina Luís

Although the long history of volunteer involvement in biological recording is widely recognized as having played a critical role in science and decision-making, the story of biological recording, its distinctive attributes, and successes, has been largely untold in many countries. Examples of this sort also exist in Portugal. There were Portuguese aristocrats with a taste for nature observation who, in their spare time, contributed to recording biodiversity, or others who, in addition to their duties, dedicated some of their free time to natural history. However, an in-depth study on the history of citizen science in Portugal was never conducted, and, particularly, tracing the history of amateur biodiversity monitoring practices has never been conducted in a systematic way. Compared with countries like Britain and Ireland where the historical legacy of biological recording is unique and inspiring, Portugal does not emerge as an example where this type of practice was very common. So, uncovering the history of biological recording in Portugal, which, in a certain way, is the same as telling the story of citizen science in the area of biodiversity monitoring, by revealing how the amateur naturalists' communities were formed and evolved across the nineteenth and twentieth centuries, and understanding when and how the public was called to volunteer in biodiversity monitoring practices is of utmost importance to help explaining why citizen science and biodiversity monitoring practices by non-experts are still residual in the country. In this paper we will unveil some examples of collective observation, and specimen collection before the professionalization of science and discuss examples of the variety of people involved in the production of scientific knowledge, ranging across social hierarchies, professions, and occupation, and contributing to the collective study of natural phenomena.

95 - History of Psychophysiology and Primatology

Room: **AY.2.107**

Chair: Kaat Wils

Timeless Spaces: The 'Labscapes' of Sleep and Circadian Science in the Mid-twentieth Century

- Kristin D. Hussey

This paper is about the spaces of sleep and circadian science in the middle part of the twentieth century. It is interested in *where* scientists felt they could best gain an understanding of sleep and *why* these locations were so often in nature rather than the laboratory. Sleep as a phenomenon is challenging to study – before the advent of technology like the EEG, researchers struggled to grasp the invisible physiological and neurological activities of sleepers. It is also highly environmental – easily disrupted by changes to surroundings and subject to the influence of artificial light, sound, vibration, and even geomagnetism. In order to attempt to control such a wide variety of parameters meant that scientists often sought locations outside the lab – using unique places as a means to grapple with the highly complex system that is the sleeping human body. Across this period, scientists experimented with a variety of different 'timeless' spaces. Underground caves, submarines, domestic bedrooms, and the Arctic landscapes of Svalbard and Greenland all served as field laboratories for the study of sleep and rhythms. A booming literature has investigated the idea of the lab as the ideal place to do science, away from the potentially disruptive influences of the 'real world' (Latour 1984; Knorr-Cetina 1995, 2001). However, as Robert Kohler (2002) argues, it would be more productive to think of science as occurring across 'labscapes' – which also occur in nature. An analysis of the location of sleep and circadian research

demonstrates the ways in which biological rhythmicity was a complex phenomenon which defied isolation in a lab setting.

"Primatology": How can a Field Name Unite a Community?

- Marie Lacomme

In the rare accounts of the history of primatology, often written by primatologists themselves, the date 1941 is almost always mentioned as the first occurrence of the word “primatology” in a publication. It is believed that it was during this period that Theodore C. Ruch have coined this neologism to entitle his bibliography of scientific studies on primates. I will show in this paper that the word "primatology" appears actually in at least two sources of the end of the 19th century.

The challenge of this paper is not only to find the first occurrence of a word. Through this study, my goal is above all to better understand the emergence and constitution of primatology as a scientific field. I want to highlight the importance that the existence of an academic community name had in this process, and the role of banner under which researchers were able to gather that this word played. In this perspective, I will also address another set of sources from the heated debates generated by the creation of two academic journals dedicated to primatology at the beginning of the 1980’s, one century after the first occurrences of the word. Faced with Allan M. Schrier who claimed not to recognize himself under such an appellation and questioned the existence of a unified “primatology” and of “primatologists”, whom he described as "mythical creatures"; several of his colleagues reacted strongly by claiming this label and proclaiming their existence as “primatologists”.

Sonic Experiments at the Margins: Inventing the Psychophysical Listener in 19th-Century Prague

- Anna Kvíčalová

The paper deals with the establishment of experimental study of sound and hearing as it was developed in 19th-century Prague at the intersections of sciences, humanities, and the arts. While historians of science have observed the emergence of a growing number of disciplines concerned with the phenomenon of sound in France and the German-speaking world in the second half of the 19th century, the history of sonic investigations in Bohemia, which became increasingly tied up with Czech-speaking Academia and the national culture around 1850, has received only a limited scholarly attention. The paper will introduce little known experiments in audition performed by the prominent experimental physiologist Jan Purkyně in Prague in the 1850s, which marked the emergence of the psychophysical study of hearing in Bohemia. It will argue that sound-based research in Prague stemmed from a growing interest in the subjective perception of sound, which was shared by physiology, deaf pedagogy, philosophy, but also phonetics and musicology. The relationship between subjective and objective aspects of hearing was often examined outside the established academic structures and was defined by the feedback loop between various academic, pedagogical, cultural, and social interests. The newly defined phenomena such as auditory attention and binaural hearing were often studied in improvised laboratory settings, such as at the Prague Institute of Deaf-Mutes or in private apartments, where new and non-standard acoustic instruments were constructed to meet specific experimental needs.

Sound and Eidetic Imagery in the 19th and Early 20th Century Psychophysiology

- Ivan Loginov

This paper deals with the history of the research of eidetic imagery in connection with sound and hearing in psychophysiology of the 19th and early 20th centuries. It aims to examine the understanding of subjectivity in sound-related psychophysiological research of the time. Research of eidetic imagery was

linked to sound related experiments and grounded in the tradition of self-experimentation and self-knowing. Analysing the work of Victor Ubantschitsch and Stanislav Vomela against the backdrop of the psychophysiological tradition of J. E. Purkyně allows us to see how research on hearing and afterimages were intertwined and how eidetics and acousmatics were shaped by different approaches to subjectivity. At the beginning of the 19th century, Czech scientist J. E. Purkyně studied subjective visual perception, including the afterimages. Almost a hundred years later, Purkyně's research inspired German psychophysiologist V. Urbantschitsch who used the term "perceptual images" to describe the subject subjectively seeing the absent object while not imagining it. German psychologist E. R. Jaensch called such images *eidetic* and established eidetics as a research program. Urbantschitsch's research of afterimages also included studies of auditory afterimages and the relations between visual afterimages and sound. Another scholar sharing the interest in both sound and eidetics was Czech physician Stanislav Vomela who analysed his own experience of hearing what he called *acousmata*. He considered acousmata an auditory analogy of eidetic images and coined the term acousmatics. Both Urbantscitsch's and Vomela's methodology was inspired by J. E. Purkyně's understanding of the subjective empiricist methodology of self-knowing.

96 - *Early Modern Science, Philosophy and Mathematics*

Room: **AW.1.125**

Chair: Dana Jalobeanu

Spinoza's Philosophy and the Birth of Contemporary Physiology

- Filip A. A. Buyse

It is often said that Spinoza (1632-1677) was interested in the new science and was in contact with leading early scientists (Robert Boyle and Christiaan Huygens included) but has never really contributed to science. By contrast, the aim of this paper is to show that his views were a very significant source of inspiration for the influential founder of contemporary physiology, Johannes Müller (1801-1858), who became the center of an international network of physiologists.

Not only in his very influential *Handbuch der Physiologie des Menschen* (1837-1840) but also in his early work, he quotes Spinoza's work. So, the question arises where and when precisely and more importantly why Müller refers so explicitly to this work and to what extent this affected the foundation of his new physiology. Spinoza is absent in biographies and recent publications on Müller so that our research will mainly be based on a primary reading of Spinoza's and Müller's work.

First, it will be argued that the historical context of Bonn played an important role. Second, it will be shown that Spinoza's theory of knowledge inspired Müller in his views concerning his law of specific energies of the sense. Third, this paper claims that Spinoza's ontology was very important since it allowed Müller to examine psychological phenomena (such as emotions, dreams, and hallucinations) in a physiological way. Finally, it will be demonstrated how Müller was inspired by Spinoza's geometrical method which he regarded as a paradigm for all the natural sciences, physiology included.

"Laboravit Tschirnhaus cum Aliis Quibusdam in Argilla": An Often-misinterpreted Quote by Leibniz Revisited

- Nicholas Zumbulyadis

Gottfried Wilhelm Leibniz summarizing his conversation of 1. October 1675 with Ehrenfried Walter von Tschirnhaus, barely a month after Tschirnhaus' arrival in Paris, wrote a brief memorandum in Latin and

German with the title "Tschirnhaus worked together with others in clay." Tschirnhaus had come to Paris after previously spending May-August 1675 in London, where he visited primarily Henry Oldenburg and also Robert Boyle. Before that, he had spent the better part of 1674 and early 1675 with Spinoza in Holland.

A cursory reading of the title of this memorandum lead early 20th century Tschirnhaus-biographer Curt Reinhardt to suggest that Tschirnhaus was already experimenting with ceramics at that time. The narrative was further expanded in the 60s with the claim that the experiment described by Leibniz was allegedly conducted in collaboration with Francois Villette using his burning mirror. Even though the Leibniz papers are now widely available, and a straightforward reading of the Leibniz memorandum reveals that the experiment is completely unrelated to ceramics, the erroneous narrative persists.

In this talk I shall argue that the experiment is nevertheless an important milestone in the evolution of Tschirnhaus' thinking. It is the earliest known experiment conducted by him that has been documented, and the first indication that this consummate rationalist was receptive to the idea of empirical/experimental inquiry. It will be shown that the experiment was most likely inspired by a specific project that Robert Boyle and Henry Oldenburg were collaborating on during the 1674-1676 time period.

Leibniz in Math: Whom? Did He Write to?

- Arilès Remaki

Leibniz has been often accused of being contradictory or inconsistent in his arguments. On a very large number of topics, it is indeed easy to find some writings from the philosopher that are contradictory with one another. Since the last third of the twentieth century, commentators on Leibniz have taken the responsibility to study those apparent incoherencies. In effect, they appeared as an obstacle to previous works that sought to establish a general system in Leibniz's thoughts.

Two explanations have been offered to make sense of this apparent complexity. The first one was philosophical, it dealt with the philosopher's irenicism, i.e his will to unify systems of thought considered as opposed. The second, more historiographical, was added later, thanks to the progresses made by the gigantic editorial work on Leibniz's pieces. It paid an increased attention to chorological aspects.

However, these two explanations can be usefully complemented by a third one. A more material and political argument: Leibniz's position depends on the nature of the text, i.e. on the people for whom he intended his writings and the use they could make of them. The exceptional nature of the Leibnizian corpus lies in its completeness. Almost everything has come down to us, from the note scribbled on an envelope to the manuscript ready to be sent for printing. In this context, Leibniz's work, and more specifically his particularly rich mathematical corpus, constitutes a valuable piece of evidence to assess the influence of the public sphere on private writings during modern times.

98 - Socialism and Science

Room: **H.1.309**

Chair: Dimitri Bayuk

Experts, Children and the State: The Establishment and Early Activity of the *Institute of Mother and Child* in State Socialist Poland (late 1940s to 1960s)

- Natalia Jarska

This paper explores the history of mother and child healthcare in postwar Poland, focusing on the key institution established in 1948: the Institute of Mother and Child. The creation of the Institute responded to urgent needs to improve children's health heavily impacted by the war and occupation, and to struggle

with extremely high infant mortality, as well as fulfilled the pronatalist goals of the early state socialist Poland. Based on published materials such as professional medical journals and books, and archival documents, the paper will analyze the process of the establishment of the Institute and the shaping of its research and practical activities from the late 1940s to 1960s. During the first decade, the Institute focused on reducing birth-related, infant and child mortality and the establishment of standards of care for pregnant women. It developed research activity in areas such as care for premature babies and nutrition. From the early 1960s on, the Institute further expanded research on developmental age, and developed broad international and transnational contacts. Using the case of the Institute of Mother and Child, the paper aims to trace the role of medical doctors in the shaping of healthcare for women and children in the postwar period, underscoring the agency of scientists and experts under state socialism, beyond the dominant image of top-down politics of science in this period.

Ideology, Autonomy and the Construction of the "Socialist Doctor": Possibilities and Constraints in Medical Education in State Socialist Hungary

- *Viola Lászlófi*

In this presentation, I aim to analyze the political and professional possibilities and constraints vis-à-vis the medical education in Hungary during the Kádár era (1956–1989). As the Iron Curtain set up by the 1950s, the sovietization of the health care system immediately began. The aim of this transformation was to construct free, universal and high-quality healthcare, which was supposed to demonstrate the moral superiority of Marxist–Leninist countries over the capitalist system. These changes also affected medical education. It became politically desirable to train professionals, who could treat patients not only with respect for medical ethics and the most up-to-date treatments, but also the socio-ideological principles of the state socialist system. To achieve this, in addition to modifying the medical knowledge to be taught during the 5 years of medical training, the transformation exerted a more intense impact on teaching methods, in particular the increasing proportion of bedsite teaching. Therefore, extensive cooperation became essential between certain fields (universities, clinics and hospitals) at the different levels of education.

In my presentation, by examining the universities' documentation of the reforms of medical education in 1961, in 1963 and in 1972 (curricula, local debates on reforms, especially on the relationship between theoretical and practical education, etc.) and documents from the Minister of Health, I aim to analyze in what contexts and at what levels of the discourse the practices of the Soviet Union and other socialist countries served as models for the transformation of medical education in Hungary. Were the different stages of these transformation related only to the problems of socialist health care or were they also related to the transformation of "Western" medicine in general? As for the reforms, to what extent was it possible to implement "bottom-up initiatives" by the members of the medical faculty, and to what extent could the universities develop their own practices and autonomous training beyond the common objectives?

Every Child According to Its Pace: School Maturity at the Crossroad of Psycho-Pedagogical Expertise and State Policies in Socialist Hungary (1960s - 1980s)

- *Annina Gagyiova*

State socialist societies and their governments understood the successful school trajectory of children as being central to the building of socialism. From the 1960s on, Hungarian experts developed reliable ways of assessing school maturity which was supposed to be decisive for the future learning performance of the young student. Pedagogues, psychologists and paediatricians expressed diverse views on how to assess school maturity and how to translate the results into effective and pragmatic solutions on the

ground. During the 1970s, experts started not only to take the physical and mental condition of the child into account but to consider the social and economic situation of the parents as well.
In order to obtain more insight on the subject the paper will draw on an array of sources, starting with experts' discourses in specialised journals, archival material on the party's position as well as the discourse presented to the wider public in popular publications.
Ultimately, this contribution aims to shed light on the question how experts of various disciplines shaped the socialist school system and therefore the modernisation achievements of socialist Hungary. While the expert discussion on school maturity was meant to overcome previous class divisions the paper will also ask if certain research categories used by experts pointed to a silent (re-)introduction of class in the supposedly classless society.

***Zoological Institute of the Academy of Sciences of the USSR* and the Tasks of Socialist Construction: Scientific Policy in Stalin's Period in Particular Institute and its Results**

- *Nadezhda V. Slepkova*

State science policy in the USSR underwent significant changes since the year of "the great turning point"(1929). These changes affected the largest and oldest center of taxonomic research – the Zoological Museum of the Academy of Sciences of the USSR, founded in 1832. Beginning from 1929 the authorities undertook a large-scale reform of scientific institutions, during which in 1931 the Zoological Museum was renamed an Institute. New requirements for the Zoological Institute, whose work was historically related to fundamental studies in systematics, faunistics and zoogeography, have been made already in 1929. Institute has been forced to take an active part in the implementation of the plans of the socialist construction and concentrate on the study of issues of practical importance.
Strict control over the substantive side of the activities of the Zoological Institute in Stalin's time led to twofold results. On the one hand, progress has been made in studying of water resources, in protecting the population from diseases with natural foci, in studying agriculturally important groups of insects, in developing methods for protecting forest belts from pests, etc. On the other hand, the totalitarian Stalinist state's control over the content of scientific research, strict ideological control, various purges and repressions led to a directive cessation of research in genetics, a serious weakening of discussions on fundamental theoretical issues of systematics, serious separation from world science. This control significantly influenced the educational activities of the Institute, the museum of which has been forced to promote "Soviet Creative Darwinism" and Lysenkoism.

18:30-19:30 – *DHST STAND-meeting*

Annual meeting of the DHST Commission on Science, Technology and Diplomacy

Room: **AW.1.121**

This meeting of the Commission on Science, Technology and Diplomacy (STAND) of the Division for the History of Science and Technology (DHST) is open to all interested in the topic. For more information on the commission, please check the website https://sciencediplomacyhistory.org/

Saturday 10

09:00-10:30 - Sessions

4 - Scholarly and Artisanal Mathematics in the Early Modern Period

Room: **AW.1.125**

Organisers: Thomas Morel & Michael Friedman

Chair: Angela Axworthy

Session Abstract:

The thesis of the early modern mathematization of nature was – and in certain aspects, still is – one of most influential of modern historiography. But as Sophie Roux argues, one sees in the seventeenth century not only very little agreement that this mathematization was a unified or a unifying project, but also the appearance of a plurality of types of mathematizations. This diversity is perceived most clearly when one examines encounters (actual or hypothetical) between practical geometers, specialized groups of practitioners and artisans (miners, weavers, glass makers, etc.) on the one side, scholars, humanists and mathematicians on the other.

The overarching theme of the three talks is the characterization of these real or imagined encounters between artisanal-material knowledge and expertise on the one hand, and mathematical knowledge, theoretical or practical, on the other hand. More explicitly, which kind of rationality emerged due to these exchanges? Our aim is to examine how the relations between artisanal-material practices and mathematics in early modern Europe may be understood and to offer new directions of research for the study of these relations.

In this rich and developing historiographical field, interactions between mathematicians and practitioners raise several specific questions: How frequent and meaningful were the actual encounters between craftsmen and mathematicians? Was there an actual intellectual influence between the two groups even if those encounters were imaginary? How did the developed machines and techniques lead in turn to new discoveries in mathematics? How did artisanal approaches to mathematics influence the interpretation and transmission of scholarly mathematics? Conversely, how did the new developments in mathematics influence the way artisanal practices were considered? In relation to this, we hence aim at exploring the way encounters between artisanal practice and mathematical scholarship impacted the content, methods, status and representation of mathematical knowledge, practical and theoretical.

Making Euclid practical in the 16th Century

- Angela Axworthy

In the 16th century, the multitude of published editions, translations and commentaries of Euclid's *Elements* (IIIrd c. BC) was rivalled by the growing number of printed treatises of practical geometry. While the *Elements* represented a model of abstraction, rigor and necessity for any scientific endeavour, clearly separated numbers and magnitudes and left aside any mention of instrumental procedures or concrete applications of geometry, practical geometry defended an approach to geometry that is hands-on, utility-oriented, based on empirical apprehension rather than on abstract concepts and logical deductions, and which furthermore promoted innovativeness and allowed for a concrete as well as for a numerical

consideration of magnitudes. Practical geometry treatises also taught a number of applications of geometry proper to utilitarian domains such as surveying, instrument-making, map-making, architecture, engineering or commercial arithmetic. Some of these works offered furthermore a practical treatment of certain Euclidean principles and propositions, which incited in turn commentators of Euclid to adopt a more practical approach to the *Elements*, e.g. by teaching the instrumental procedures involved in the construction of figures or by referring to concrete applications of Euclid's propositions. The goal of this talk is to show the different ways in which Euclidean principles and propositions were treated according to a practical approach in the 16th century, and what this meant for the representation and uses of geometry, and of its relation to practical and applied knowledge in the early modern era.

Textile Practices and Mathematical Knowledge in the 17th Century

- *Michael Friedman*

Joachim Jungius (1587–1657), a German logician and mathematician, is mostly well known for his studies in chemistry, logic and botany, and due to the fact that Leibniz highly appreciated his studies. However, in one of his hardly researched texts, *Texturae Contemplatio*, being a collection of notes from the 1620s and 1640s, Jungius investigates mathematically as well scientifically textile practices. These investigations range from offering a geometrical presentation of various weaves, to examining weaves with magnifying lens and seeing textiles as embodying essential characteristics of matter; the latter were brought to exemplify his theory of *hypostatical* and *synhypostatical parts* of materials. Moreover, in other notes on textiles, Jungius offers implicitly a critique on what he calls "Sennert's axioms", underlining a revision of Sennert's negative-empirical conception of the atom.

However, Jungius was not the only one interested in textiles and their ways of production during the 17th century: Robert Hooke also depicted silk and taffeta with a "magnifying glass" in his 1665 *Micrographia*; Samuel Hartlib, in a series of letters written in the 1650s discussed innovations in weaving, pointed out that certain looms have a close connection with mathematics; Leibniz compared in 1676 an automatic knitting machine to his own calculating machines. The talk will examine the ways textile practices (and the artisanal knowledge supporting them) were considered as worth investigating scientifically or mathematically. How did the various approaches to textiles advance scientific knowledge? Were the artisans themselves considered as carrying such knowledge, or whether they were marginalized?

The Mines and the Court: Artisanal Practices and Mathematics in Early Modern Dresden

- *Thomas Morel*

In the early modern period, the Saxon elector was a powerful ruler of the Holy Roman Empire, whose Dresden residence gradually became an important court. Augustus of Saxony (1526–1586) and some of his successors had a personal inclination for mathematical instruments and constantly encouraged the advancement of sciences. At the same time, the extraction of silver made a substantial share of Saxony's revenue, and the cultural influence of mining cities was immense.

In this talk, I intend to present how the practical mathematics that first developed in the mining pits of the Ore Mountains found a prominent place at the Dresden court. The pathways of two main dynasties of practitioners, the Rieses and the Öders, will be presented in some details. Adam Ries (1492–1559) was a reckoning master who played an important role in the mining administration and was appointed *court arithmeticus* by the Elector. Georg Öder (?–1535) was an underground surveyor in Annaberg.

After both patriarchs contributed to the economic rise of the mining city of Annaberg, their descendants became versatile engineers and courtiers of the Saxon Electors. They collaborated with

university professors and instrument-makers, using their skills all over the Electorate and beyond. Their influence was both intellectual and very concrete, temporarily turning the court of Dresden into a centre of practical mathematics. These confrontations of methods and values tells a lot about the transformation that mathematical disciplines were undergoing at the turn of the seventeenth century.

14 - Science Policy in Central Europe in the First Half of the 20th Century in the Mirror of Correspondence of Scientists – 1

Room: **AW.1.120**

Organisers: Milada Sekyrková & Adéla Jůnová Macková

Chair: Milada Sekyrková

Session Abstract:

Correspondence has long been an important means of communication in science as well. Written communication between scientists can highlight the circumstances that remain hidden when writing scientific publications. The correspondence also reveals the private opinions of its authors on the subject of research, the institution where the person works or on science policy and politics of science. It is important for knowledge of institutions, places, and spaces of scientific knowledge, patronage and science funding: public and private interests, trials and standardization in science making etc. etc.

The subject of our symposium is correspondence of the Central European scientists, which looks behind the scenes of local scientific policy, shows its light and shadows.

In particular, it will focus on the authors' opinions on the formation of a scientific network in Central Europe in the 1st half of the 20th century (millestones: WW1, WW2), on contacts with foreign countries and the support that Central European science and scientists received from their colleagues from other countries. Research conducted outside Central Europe and cooperation with the authorities and institutions of the countries where the research took place will be noted, too.

The symposium is open to accept other colleagues who would, for example, propose papers relevant to our topic as part of stand alone proposals.

Science Policy of the Interwar Czechoslovakia in Alois Musil's Correspondence: State, Orientalists and Orient

- Adéla Jůnová Macková

The demise of the Habsburg Empire and the emergence of the successor states meant political, cultural as well as economic independence for Czechoslovakia. I would like to demonstrate the intertwined nature of Czechoslovakian science policy and its economic interests on the example of Czechoslovakian relationships with the Orient and on the formation of Oriental studies. A significant contribution to the foundation was by Professor Alois Musil, a scholar of the University of Vienna and consecutively of the Charles University in Prague. The renowned orientalist, traveller and expert on the middle eastern countries was not only supposed to work as a Professor of the Charles University, but he was also to support the Czechoslovakian entry to the oriental market with his knowledge and experience.

The correspondence of Alois Musil documents the support of government officials and ministries for the orientalists and their travel stipends. Once in destinations, they both worked scientifically as well as gathered market information about their respective countries. Thanks to the research and scientific

knowledge acquired abroad they were habilitated, and new fields of study were established at the Charles University together with the financial support for these in form of new positions for professors. To better explore this matter a new database of Alois Musil's correspondence is being prepared as part of a broader project "Historical correspondence" on the Academy of sciences in Prague.

Reflections on Political Events in the Texts of Bedřich Hrozný

- Šárka Velhartická

Bedřich Hrozný's life work, which is in his publications, correspondence and other documents, reflects the historical development of the Czech lands from the end of the 19th to the mid-20th century. Even the preserved letters that Hrozný wrote from Vienna during the course of his studies contain numerous mentions and references to political events at the end of Austro-Hungary. After the foundation of an independent Czechoslovakia, many Czech academicians originally working in Vienna became professors at Czech universities and went to great lengths to establish Czechoslovak Oriental studies. Bedřich Hrozný, who gained prestige for deciphering the Hittite language and was a world-renown expert in the field of Near Eastern studies, also became an active figure in academic life and public events. He introduced his plans to elevate Czech science in his inaugural lecture, and as a former Viennese librarian he strove to build up modern Czech libraries. He was also successful in realizing financially and organizationally demanding archeological expeditions to the Orient. During his activities in the position of Dean of the Faculty of Philosophy and namely during his numerous lecture tours around European countries, he was engaged in the effort to promote Czech Oriental studies and lead European scholars into closer cooperation.

The forgotten materials concerning his journey through the Soviet Union and activities on the International Committee on Intellectual Cooperation in 1939 present Hrozný as an individual with an exceptional scope and many interests, and are an important source for insight into the interwar period.

Science Policy after 1918 in Czechoslovakia: Help from Abroad, the Case of Aleš Hrdlička

- Milada Sekyrková & Marek Ďurčanský

Aleš Hrdlička (1869 Humpolec – 1943 Washington, D. C.), an anthropologist of world importance born in Bohemia, spent most of his life abroad. In 1903 he founded and became the first curator physical anthropology of the U. S. National Museum, now known as Smithsonian Institution. National Museum of Natural History in Washington D. C. He did his anthropological research all over the world, collected anthropological material which became the subject of research for generations of his followers.

Hrdlička never broke off contacts with the Bohemian lands. His support for local research institutions intensified after 1918, after the establishment of an independent Czechoslovakia, and it is well documented by his correspondence with Czech colleagues, especially Jindřich Matiegka (1862 – 1941), professor of anthropology at Charles University in Prague.

The collection of their letters begins at the end of the 19th century and reflects Hrdlička's efforts to expand Czech anthropological collections and to support local colleagues in their contacts and scientific trips abroad. After 1918, Hrdlička also took a keen interest in forming a network of Czechoslovak scientific institutions, which he still supported, and also expressed numerous views and advice on how to support scientific institutions in building and developing them.

The paper will focus on the communication between Hrdlička and Matiegka and their views on science policy in the new Czechoslovak state, seen from the inside (Matiegka) and from the outside (Hrdlička).

27 – Scientific Temporalities in the 19th and 20th Centuries – 1

Room: **AY.2.107**

Session organiser: Staffan Bergwik

Chair: Staffan Bergwik

Session Abstract:

Since the 1990s, history of science has been dominated by an interest in the spatial dimensions of knowledge. Local places and "knowledge in transit" have been recurring analytical themes to describe the circulation of knowledge. This symposium contributes to a reorientation in the field towards an historical analysis of the temporality of knowledge. Today, the timescales of science, society and environment emerge as pressing scholarly issues against a backdrop of an ongoing temporalization, mainly driven by discourse on contemporary and convoluted crises of climate, health and democracy.

This symposium aims to explore scientific temporalities in the 19th and 20th centuries. The papers explore how multiple timescales in nature and society have been represented and synchronized in scientific knowledge making. We investigate influential ideas about chronology, origin and archives in nature and history writing. Moreover, the papers discuss the temporality of knowledge making itself. How has the rhythm of knowledge been perceived and represented? Furthermore, the papers engage with a period when the modern sciences were increasingly integrated in state infrastructures of the Western world. Accordingly, a crucial concern is the relationship between timescales in science, the environment and politics. How have timescales of knowledge making played out against the temporality of society and the natural world? Departing from studies of time within the humanities, the panel will explore the temporal logic of human and planetary timescales in the 19th and 20th century sciences, with repercussions on both science and contested political issues.

The symposium seeks to facilitate a conversation between history of science and neighbouring fields. Accordingly, it brings together scholars from history of science, environmental history and history of the humanities.

Provenance and the Multiple Timescales of Nineteenth-Century Archives and Historiography

- *Emma Hagström Molin*

It is widely acknowledged that the most applied organizational principle of Western archives – the provenance principle – had its breakthrough in the nineteenth century (Uhl 2001). It is less studied, however, how this emblematic change in the organization of historical records, and thus in how the past was perceived, interplayed with the different temporalities and timescales of the sciences, which archives were supposed to facilitate. Therefore, my paper explores the epistemic shift in which European archives went from following orders based on chronology and pertinence to implementing origin as the general ordering principle, and the consequences of this structural transformation. It has recently been argued that modern European archives became the physical spaces where a nationally bound concept of time was rooted (Steglich 2021). Without contesting this statement, my paper considers archives and historiographies that challenge the temporal regime of the secular Western nation states: such as the records of the marginal crownland Moravia in Habsburg Austria, and of religious institutions such as the Vatican and the Teutonic Order. These cases reveal that the new national time interplayed with the far more planetary timescales of nature and Christianity. I argue that the provenance principle, caused by archive centralization within nations, challenged the scholarly understanding of what scientific order is, since the latter relied on geological and Christian chronologies rather than national history. I conclude with illuminating how multiple timescales were synchronized, and thus in time, how provenance could be harmonized with the scientific needs of historiography.

Little Red Ring Binders: Early Red List Temporalities

- Marit Ruge Bjærke

Today, knowledge of species threatened with extinction is presented through electronic Red List databases. During the 1960s and 1970s, however, the International Union for Conservation of Nature published their knowledge of threatened species in red ring binders – so-called Red Data Books. This paper explores the temporal logics present in these early compilations of threatened species, arguing that the use of different media and formats both reflect and enable different knowledge practices.

In the Red Data Books of the 1960s and 1970s, the deliberate incompleteness of the ring binder medium facilitated a convergence between the scientific wish for new knowledge and its political use. The ring binder medium made it possible to increase the number of species data sheets in the Red Data Books regularly, to accommodate for a rapid expansion in the knowledge of threatened species. As the ring binders became gradually more packed with data sheets, however, they also highlighted the increasing size of this environmental problem.

Several of the people who produced the Red Data Books were natural scientists and did field work around the world, while at the same time acting as political lobbyists. Thus, the time span between acquiring new scientific knowledge, circulating it in the scientific community, and using it in political efforts to stop specific extinctions was short. Both the texts and their materiality show the early discourse on threatened species to be focused towards political action and the near future, rather than on mourning species that were already lost.

Discussion

29 - Astronomers' Histories of Astronomy: Practices around the Paris Observatory (18th-19th Centuries) - 1

Room: **AY.2.108**

Organisers: Giorgio Matteoli, Matthieu Husson, Christophe Schmit

Chair: Christophe Schmit

Session Abstract:

Astronomers of different periods and cultures ordinarily relied on astronomical works made in some cases several centuries before, in contexts very different from that of their own practices. Accordingly, they may discuss the theoretical, instrumental or observational basis on which these works were initially built or the documents and intermediaries through which they were transmitted to them. In particular situations, these discussions may develop into consistent attempts at writing different kinds of history of astronomy.

Analyzing the changes in the historiographical discourses thus produced by astronomers is a promising venue of research which may for instance allow us to track changes in the practices of astronomers as well as the relations of these changes to broader institutional and political dimensions. The symposium seeks to explore this general issue focusing on the historiographical practices of 18th and 19th centuries astronomers connected to the Observatoire de Paris. From Cassini to Delambre, including Delisle, Le Monnier, Lalande and many others, astronomers connected to key political scientific institutions in France Observatoire de Paris, as well as the Académie royale des sciences de Paris, produced differents

historiographical discourses on astronomy. These discourses reflect the perspectives of these key political scientific institutions as well as some of the deep transformation astronomy practiced in Europe underwent in this long 18th century with echoes linked to the enlightenments on a global scale.
Thus the presentations of this symposium will address issues including:

- the types of sources, their uses by the astronomers and how they access and collect them;
- the topics and questions their historiographical discourses address, and the kind of historical actors they consider;
- the conceptions of the discourses, of historical causality or temporality, and if so what issues they are connected to issues broader than the history of astronomy strictly.

Genres of Celestial History

- Florence C. Hsia

Soon after its founding in 1666, members of the Paris Académie royale des sciences chose to publish their material in the form of memoirs, detached descriptive pieces meant to serve the memory and the eventual composition of comprehensive histories. This generic distinction took institutional form in the Académie's eighteenth-century annual publication, the *Histoire et mémoires*, whose volumes drew a clear distinction between the yearly narratives of the academicians' work and the separate texts that individual members had read to their assembled colleagues. This paper draws on the Académie's contrast between history and memoir to reconsider various efforts by its astronomers—Delisle, Le Monnier, Cassini IV, Lalande—to write about their own ideas and practices and those of their predecessors.

The Astronomer Figure in the Éloges of the French Royal Academicians: A Matter of Politics?

- Dalia Deias

At the beginning of the 18th century, Bernard le Bovier de Fontenelle, astronomer, courtier and secretary of the Académie royale des sciences, started to publish the Éloges of the dead royal academicians. This is the inauguration of a specific (and glorious) historiography for this French institution and, of course, for the Paris Observatoire royal. The Éloges were for a long time one of the main sources for biographical details and for the whole academiciens' careers described in them . But how were these discourses created? How biographical and scientific information was collected and selected? Which sources were used by Fontenelle and why? Using the Éloges of some French astronomers from the Observatoire royal, I will show how the French Academy described the astronomers, but especially how French astronomers and academicians did (or had to) describe themselves.

Cassini I and Fontenelle on the History and Progress of Astronomy

- Daniel Špelda

In my paper, I want to compare the views of Jean-Dominique Cassini and Bernard de Fontenelle on the progress of astronomy. Although both authors saw the history of astronomy as a continuous process of progress, interrupted several times by periods of barbarism, they differed in perspective. Cassini was a sober commentator on the previous astronomical tradition. For him, the history of astronomy was primarily a history of observations and the gradual improvement of instruments, including observational techniques. Cassini also favored the exclusion of philosophical speculation from astronomy (e.g. the Pythagorean mysticism of Kepler). Fontenelle took a more general and philosophical approach to the history of astronomy. For Fontenelle, the history of astronomy was part of the history of human thought,

which he (and later many others) called "the history of the human spirit" (l'histoire de l'esprit humain). According to this idea, the progress of astronomy was bringing liberation from authority and emancipation of the human spirit from prejudices and superstitions. Cassini thought of astronomy purely from a disciplinary perspective and understood the history of astronomy as the slow progress of the discipline towards accuracy and the final stage of perfection. Fontenelle understood the history of astronomy as a process that frees human thought from the shackles of authority and superstition – and that has no identifiable end.

38 - The Politics of Data, Environments, and Infrastructures - 1

Room: **AW.1.121**

Organisers: Matthew Adamson & Doubravka Olšáková

Chair: Grigoris Panoutsopoulos

Session Abstract:

One of the most prominent topics in science diplomacy is knowledge infrastructures: their creation, their upkeep, and their implications for international relations, resource conservation, and environmental stability. Historians have discovered increasing evidence across time periods and scientific disciplines that geopolitics profoundly informs data collection and sharing (Aranova, 2017) as well as establishes the conditions and possibilities of the study of world systems (Edwards, 2017). This panel, sponsored by the DHST Commission on Science, Technology, and Diplomacy (STAND), extends this line of inquiry by considering milestones of historical knowledge infrastructures, international environmental and natural resources surveying, cartographical establishments, and astronomy and space science. The insights of these historical researches are of inestimable significance in our current period of big data, climate change, and biosphere degradation. This panel provides the sorts of diverse perspectives on these global infrastructures necessary for furthering historical research and indicating the relevance of that research to as wide an audience as possible. It shows that data is never "raw", but a result of diplomatic as well as scientific initiative, and therefore a matter of considerable importance to those studying science diplomacy.

Science Diplomacy behind 'Data Politics'? Collaboration and Competition in the Setting up of IGY World Data Centers

- Simone Turchetti

Today's World Data System builds on the experience of the International Geophysical Year, 1957-58 (IGY) when a primeval system of World Data Centers was set up. In essence the IGY materialized, seemingly for the first time in history, the idea of interconnected global data repositories.

The establishment of these centres, however, signalled the beginning of 'data politics' too, especially through the definition of A- and B-type repositories managed exclusively by US and Soviet research organizations. Hence, as already noted elsewhere, 'geophysical data participated in a subtle Cold War political economy' (Aronova, 2017).

This paper seeks to explore further the diplomatic activities underpinning this specific configuration favouring the superpowers. The definition of C-type centres seems equally important to probe, given their

allocation only to national groups in Europe, Japan and Australia. What negotiations led to this uneven distribution? How did other countries contributing to the IGY react to this configuration?
'Science diplomacy', I argue, seemingly helped to perform the data politics distinctive of the IGY, also grounding it on the principles collaboration and competition that drove its further development in global data schemes and diplomacy practices during the 1960s and beyond.

The 'Soul' of ALMA: Science Diplomacy in a Transnational Astronomical Facility

- *Barbara Kirsi Silva*

ALMA – Atacama Large Millimeter/Submillimeter Array is a massive facility of radio astronomy, of 66 giant antennas located at 5,000 masl in the Atacama Desert, Chile, inaugurated in 2013. It took extraordinary efforts to build ALMA, and it was only possible by bringing together North America, Europe, and East Asia. Each one of these areas is represented by an organization, of significantly different nature: NRAO (National Radio Astronomy Observatory), run by a US private corporation; ESO (European Southern Observatory) – an international treaty organization; and NAOJ (National Astronomical Observatory of Japan), a state/public institution. These partners had to deal with one another and, at the same time, with several institutions within the host country. We can understand this process through the lens of science diplomacy, articulating scientific drives, political perspectives, and institutional conditions. Making ALMA real involved long negotiations, starting from the 1990s, and taking as precedent former international agreements of astronomy signed in the country in the 1960s. This proposal seeks to discuss the role of science diplomacy in articulating ALMA's project, bringing together previous experiences in transnational astronomy, whereas taking a step forward into the future of science and technology. In this matter, one of the challenges was how to homologate massive investments -of money, time, people, etcetera-, for this to retribute to each partner and, at the same time, to fulfill the interest of Chile in becoming increasingly and globally influent in astronomy.

The Prelude to US-China Space Cooperation: The Role of Satellite Ground Stations in Nixon's Rapprochement with Beijing

- *Tonio Savina*

While Sino-American space relations are currently at a standstill, previous decades saw significant cooperation between the two countries. This cooperation has been extensively studied by both Western and Chinese scholars, who have traced its origins to the end of the seventies, when President Carter tried to use space issues – and scientific exchanges in general – as a means to reinforce relations with the People's Republic of China (PRC). Less attention has been given to the early seventies, which can be regarded as the prelude to US-China space cooperation. This talk will therefore try to shed some light on this earlier period, by analysing the role of satellite ground stations in Nixon's attempt to achieve rapprochement with Beijing. Drawing on technicians' personal memoirs and US government declassified documents, it will first be shown how the United States prepared for Nixon's historical visit to China in 1972. The Americans proposed to provide the Chinese with two temporary mobile stations, in order to transmit via satellite live television pictures and the material needed for press coverage. Then, making use of Chinese sources, I will focus on the Chinese Communist Party (CCP) reaction to the US proposal, analysing the debate inside Zhongnanhai, where not everyone was willing to rely on the US ground stations. Finally, China's request to rent a satellite channel from the US-dominated International Telecommunications Satellite Organization (Intelsat) will also be considered, highlighting how for the Chinese government this became not only a technological issue, but also a politically relevant one, specifically with regard to the issue of Taiwan.

51 - Expertise in the Low Countries in the Early Modern Period - 1
Room: **AY.2.114**

Organiser: Maarten Van Dyck

Chair: Steven Vanden Broecke

Session Abstract:
Expertise is often portrayed as a special property possessed by a select group of people, but so-called relational approaches treat it instead as "a network connecting together not only the putative experts but also other actors, including clients and patients, devices and instruments, concepts, and institutional and spatial arrangements" (Eyal 2013, 873). On this alternative view, the establishment of expertise not only depends on the development of specialized knowledge, but also requires extended processes of negotiation on the adequate framing of the problems to which such knowledge provides the answers. Different definitions of the nature of a problem can lead to very different expectations about the characteristics of adequate answers. Accordingly, the relevance of certain types of specialized knowledge is also the outcome of prolonged social and material struggles that precede the relative stabilization of a network of expertise. In this symposium, we will analyze the construction of networks of expertise in the Low Countries in the Early Modern period. We will look at how actors were actively exploring novel ways in which purported knowledge could be shared and be put to work in new social and epistemic places, how they were shaping the expectations of the new audiences that they were actively constructing, and how these audiences were trying to find out how to decide whom to trust.

Historicizing Expertise: Challenges and Opportunities
- Maarten Van Dyck
This programmatic paper will set the stage for the other papers in the two-part symposium by offering some general historiographical reflections on the central topic. The most important challenge in attempting to use the concept of expertise to frame historical research is the suspicion that it might be an essentially modern concept which cannot be straightforwardly applied to earlier periods. It will be shown how a relational approach is particularly well suited to study how the construction of stable networks of expertise is not necessarily tied to the heavy administrative apparatus and strongly centralized institutions characteristic of the organization of expertise in modern nation-states. Using the concept as historiographic lens also offers some novel opportunities for the history of early modern science. First, it makes it possible to revisit the debates surrounding the Hessen-Grossman thesis on the origins of the scientific revolution without falling back in reductive traps set by oppositions such as science/technology or scholar/artisan (let alone internal/external). Second, it can show the limitations of more recent history focused on disciplines with their modes of institutionalized certification of knowledge by shifting attention to the socially distributed mechanisms through which credibility is built. In conclusion, it will be suggested that both points can be exemplarily illustrated by looking at the Low Countries in the early modern period, a highly dynamic society confronted with rapid changes that destabilized the very definition of the challenges it was facing – and thus inviting a vigorous exploration of novel kinds of solutions.

Dutch-language Literary Communities and the Productivity of Expertise, 1550-1650

- Arjan van Dixhoorn

Both network-analyses and discourse-analyses of the early modern Dutch literary world have been instrumental in establishing the so called rhetoricians and their chambers of rhetoric as key vectors in the shaping of a culture that celebrated individual expertise in the arts and sciences (in Dutch: *conste*). By the 1550s, out of the knowledge communities they had built, a shift in the perceived societal need and urgency of expert knowledge furthered the growth of a more productive collaboration and specialization of interests among its members. By the 1700s, in the Dutch Republic, new pressures on expert performance helped to produce a drastically re-configured institutional context for the organization of more productive forms of expertise. My paper will highlight a few cases that exemplify this normative turn towards heightened expectations of expert productivity. The focus will be on communities and networks of rhetoricians and their allies interested in hydraulics around 1600.

Expertise in Early Modern Printmaking

- Marlise Rijks

Like Instagram today, printmaking caused a revolutionary increase in the number of images in the early modern period. And as today, new image-making technology was appreciated but also debated, as well as the cause of legal conflict. Printmaking was a revolutionary new image-making technology not necessarily because machines took over a large part of the making process (in fact, engraved or etched copper plates were labor-intense products made by thoroughly trained craftspeople), but because large numbers of more-or-less uniform products were sold at spectacular low prices and easily transported all over Europe. This resulted in a new status of printmaking: of the people involved, the making process, and the products (prints). Radically new ideas were developed about copying and copies; and about authorship, design, and execution. In the same era, c. 1550-1800, the old and inclusive ideal of the 'arts' was replaced with new ideas about first the 'liberal arts' and later the 'fine arts'. In these new schemes, art became separated from technology (and the crafts). Different ideas and ideals about 'expertise' were developed in art versus technology. Yet the separation of art and technology and the development of different forms of 'expertise' is not obvious; it was developed in Western Europe in the early modern period. In this paper, I look at expertise in printmaking in the early modern Low Countries to investigate this important watershed.

84 - Science and Visual culture

Room: **UB.2.147**

Chair: Brigitte Van Tiggelen

Westerns and the Construction of a Visual Socio-cultural Space for Natural History in late Franco's Spain (1960s-1970s)

- Carlos Tabernero

Film history is rich in conceptualizations of nature and the environment. Among different genres, westerns have been largely overlooked as sources of information for historical and socio-cultural scrutiny concerning processes of production, circulation, and management of scientific knowledge. However, westerns narratives have been and arguably still are extremely influential in socio-political terms as unequivocally rooted in a wide range of representations and interrogations of narratives about nature and the environment, particularly in connection with human colonial and technological endeavors related

to different ways of exploitation of natural resources.
This paper offers a historical reading of a range of fiction film narratives produced in 1960s-1970s Spain, which were unequivocally influenced by the narrative and aesthetic conventions of western movies, and where nature and rural/urban divides, at a time of rising socio-political concerns regarding the environment, were either part of the main concern or somehow essential, as background elements, for plot development. I will situate these narratives in the historical context of film and television production and programming of both fiction and documentary pieces, paying particular attention to their combined role in the socio-politically convoluted construction of a visual cultural space for natural history during the last decade of Franco's regime.

To Design, or Not to Design… The Role of Exhibit Design in Landmark Science Presentations of the 1960s from MATHEMATICA to the Exploratorium

- *Arne Schirrmacher*

The turn from presenting historical artefacts to a wider public towards involving visitors with interactive and sometimes immersive experiences from 'edufacts' is probably the most dramatic change in postwar science presentation. The corresponding shift from the science museum to the science centre had the most profound ramifications, both conceptually and politically. When objects of display can be built by the exhibition makers themselves, the design question arises that goes beyond exhibiting and framing objects nicely. Rather vast opportunities for designing visitor experiences emerge, ranging from developing presentations of specific scientific phenomena to creating ways to communicate scientific principles as well as practices and values prone to political influence.
I analyse four cases to trace when exhibit design(ers) entered major science presentations and why it became a matter of controversy in the earliest science centres. At the 1961 MATHEMATICA exhibit in Los Angeles, Ray and Charles Eames proposed a new communication design for science, which extended to the 1962 U.S. Science Exhibit at the Seattle World's Fair. The Ontario Science Centre and the San Francisco Exploratorium, opening almost simultaneously in 1969, were opposite in terms of design. In Canada, priority conflicts between the science and design departments delayed the opening; at the Exploratorium the creation of a design department failed repeatedly. Instead, the improvised and unfinished quality of their interactives became a hallmark. Prototyping and learning from the visitor reaction proved effective, and design pertaining more to the overall visitor experience allowed for a successful science presentation.

Photography and the Making of Science in Portugal (1850s-1920s)

- *Hugo Silveira Pereira*

In the second half of the nineteenth century and early years of the twentieth, Portugal undertook an ambitious modernising programme based on technoscientific grounds, aimed at developing the country and bring it closer to its European neighbours. Most of that programme was directed to the construction of large public works, but a substantial part of it included to the creation, enhancement, maintenance, or development of scientific institutions (laboratories, museums, schools, universities, hospitals, etc.). This process coincided with the diffusion of photography as a practice in Portugal. Photography was a profoundly subjective practice (its final product depended on the choices of the photographers regarding the angle, composition, people photographed, and on the goals they sought to accomplish), but since it was accepted as an objective product of science and technology it became a powerful tool to create specific landscapes. In this essay, I analyse a group of photographs of scientific institutions and agents from varied sources to determine the representations of science created by photography in Portugal. I argue that the repetition and accumulation of specific elements in these photos (specially those that found their way to the illustrated press) motivated the creation of a new scientific landscape that proved

that Portugal was becoming a modern nation. I use a methodology that combines semiotics with analysis of photojournalism. In this respect I also include in the analysis textual elements, considering that photography cannot be dissociated from the documental context where it is embedded.

102 - Eighteenth Century: Networks and Laboratories

Room: **AW.1.126**

Chair: Jip van Besouw

The Political Project of the *Societas Meteorologica Palatina* (1780-1795) through the Correspondence of Jan Hendrik van Swinden (1746-1823)

- *Simon Dolet*

In 1780, the foundation of the *Societas Meteorologica Palatina* was a decisive step in the institutionalisation process of the meteorology. The Prince-Elector Karl-Theodor decided to add a new section to his Mannheim Academy of Science. His project is to unravel the mysteries of the climate by standardizing practice - tables and meteorological instruments in particular – in order to compare data between different locations, hoping to improve agricultural production. This patronage gave birth to the first worldwide meteorological network. From its 15 years of existence, historians remembered the birth of modern forecasting meteorology. At the heart of historiographical questions since the end of the 19th century, climatology has stimulated a new wave of research since the beginning of the 21st century. Nonetheless, a single source feeds all these studies: the twelve volumes of the *Ephemerides Societatis Meteorologicae Palatinae*, the proceedings published by the Society. My contribution proposes to depart from this institutional source. The aim is to understand this political project and its impact on police science through the actors, thanks to the concepts of circulation and network. Correspondences, mostly unpublished, will feed my reflection. The archives of Jan Hendrik van Swiden (1746-1823), Dutch meteorologist, will be our guide : 2,000 letters for 300 correspondents throughout Europe. They allow us to demonstrate the criticism made by observers, particularly towards the quality of the instruments sent by the Prince-Elector, but also the hope placed in this organization. Other correspondence may support this statement, in Italy with Toaldo or Calandrelli, in Russia with Mayer…

International Policymaking in the Laboratory: Projects of Metrological Unification in late Eighteenth-century France

- *Emma Prevignano*

In 1798, the National Institute and the French minister of Foreign Relations invited European countries to send delegations of science practitioners to Paris to finalise the value of the metre and the kilogram. French reformers hoped that this would encourage foreigners to adopt, or at least recognise, the new metrological system conceived during the Revolution. This presentation reads the international meeting as an attempt to establish the political relevance of international savant consensus. Before the Revolution, the French leading chemical expert Louis Bernard Guyton de Morveau had proposed to define common metrological units to be employed in science writings across Europe. The savant had argued that nations would follow the lead of science academies in adopting the new weights and measures. In the circle of French reformers, the notion that international political consensus on metrological reforms could stem from savant approval survived the Revolution and directed their efforts to construct an international reputation for the metric system. However, European savants and governments did not agree that metrological reforms fell under the expertise of science practitioners, rather than under that of trading

actors or administrators. They were also split over how much leeway savants had to break free from national metrological regulations. Although the 1798 international meeting did not secure any real international consensus on the suitability of the metric system, it was more successful on two levels: it promoted science practitioners as main experts in metrological matters, and it advanced precision and rationality as key parameters to assess metrological systems.

Van Musschenbroek and Duhamel on the Strength of Materials

-Pieter Beck

In this paper, I discuss Petrus van Musschenbroek's research on the strength of materials. Both in his methodological writings as in his earlier writings on the strength of materials, van Musschenbroek presents the search for laws and regularities as the main aim of research. However, due to the heterogeneity of the materials he investigated, van Musschenbroek gave up the search for laws in his experimental research on the strength of materials. At the same time, he intensified the practice of parameter variation in his research. Using more recent literature on exploratory experimentation, I show how this relates to van Musschenbroeks practical interests and brings his work closer to engineering. Because of this, varying experiments was no longer an end to a means, i.e. finding regularities, but a source of information in itself. To further explore this point, I will end with a discussion of Henri-Louis Duhamel du Monceau's work on the strength of ropes. Duhamel's experimental practice was informed by van Musschenbroek's work. At the same time, his interests were even more practical than those of van Muschenbroek. Duhamel also enjoyed institutional backing from the *Académie Royale* and the French navy. This will allow me to further analyse the place of this type of experimentation in the wider context of 18th century processes of the institutionalisation of scientific research.

11:00-13:00 - Sessions

15 - Science Policy in Central Europe in the First Half of the 20th Century in the Mirror of Correspondence of Scientists - 2

Room: **AW.1.120**

Organisers: Milada Sekyrková & Adéla Jůnová Macková

Chair: Adéla Jůnová Macková

Session Abstract:

Correspondence has long been an important means of communication in science as well. Written communication between scientists can highlight the circumstances that remain hidden when writing scientific publications. The correspondence also reveals the private opinions of its authors on the subject of research, the institution where the person works or on science policy and politics of science. It is important for knowledge of institutions, places, and spaces of scientific knowledge, patronage and science funding: public and private interests, trials and standardization in science making etc. etc.

The subject of our symposium is correspondence of the Central European scientists, which looks behind the scenes of local scientific policy, shows its light and shadows.

In particular, it will focus on the authors' opinions on the formation of a scientific network in Central Europe In particular, it the 1st half of the 20th century (millestones: WW1, WW2), on contacts with foreign countries and the support that Central European science and scientists received from their colleagues from other countries. Research conducted outside Central Europe and cooperation with the authorities and institutions of the countries where the research took place will be noted, too.

The symposium is open to accept other colleagues who would, for example, propose papers relevant to our topic as part of stand alone proposals.

Science Policy in Germany after 1918: The Correspondence of Ladislaus von Bortkiewicz

- Annette Vogt

Ladislaus von Bortkiewicz (also L. Bortkewitsch, 1868-1931) was an economist, statistician, an academic teacher in Berlin and “European scholar.” Born in a Polish noble family he studied law in St. Petersburg until 1890 then he moved abroad and concentrated his education on economics and statistics. He studied at the universities of Göttingen, Vienna, Leipzig and Strasbourg (then Strassburg, belonging to Prussia). In 1893, he received his doctoral degree at the University of Göttingen with the thesis “On the average duration of life, methods to measure it, and its relation to mortality measurement”. From 1895, he was Privatdozent at the University of Strasbourg, a position he gave up in favor of a position at home, where he was working for the railroad company in St. Petersburg between 1897 and 1901. From 1901 on, L. von Bortkiewicz was associate professor of statistics at the University of Berlin, and only in 1920 he became full professor. From 1906 to 1922, he also taught statistics, actuarial mathematics, and population science at the Berlin School of Economics (Handels-Hochschule Berlin). The collection of letters - in total 991 letters - covers more than 30 years of his life. Thanks to these letters one is able to reconstruct the circulation of knowledge and different aspects of science policy. There are letters written by his teachers - Wilhelm Lexis and Georg Friedrich Knapp -, by his friends, and by his colleagues. Interesting was his enormous correspondence with colleagues in Scandinavia, in Russia and Soviet Union, UK, and USA.

The estate, the “Bortkiewicz papers”, with manuscripts and letters, is kept in the Archives of the Uppsala University Library (41 boxes).

Mathematicians' Affinity to Complex Problems Can Overcome Distance for More than 60 Years – Correspondence between Josip Plemelj and Georg Faber

- Željko Oset

At the beginning of 20th century, a Riemann problem (among others) encompassed mathematicians. The Riemann problem is very useful for understanding equations, and it also gives an exact solution to some complex nonlinear equations. Thus, solving this problem was the most prestigious achievement of Josip Plemelj (1873-1967) that gave him recognition among European mathematicians, especially among German-speaking ones. Plemelj studied Mathematics at the University of Vienna. His professor Gustav von Eschreich provided tutelage and social capital, which was quintessential for a young researcher with an ambition to become a professor. Plemelj broadened his horizon and social network with postdocs in Berlin in Heidelberg. Upon return to Vienna, Plemelj became a private senior lecturer at the University of Vienna. In 1906, he was appointed assistant at the Technical University of Vienna. In 1907, he became associate professor and, in 1908, full professor of mathematics at the University of Chernivtsi. And in 1919, he became full professor at the University of Ljubljana. His residing in smaller towns away from major academic centers 166rerequisite that Plemelj maintained his contacts through correspondence. His main major correspondence was with people with whom he established contacts in youth during his early career in Belin, Heidelberg, and Vienna. Hence, through correspondence, it can be observed several facets, professional and personal as well. Special attention will be given to correspondence between Josip Plemelj and German mathematician Georg Faber (1877-1966). They acquainted themselves in Berlin and retained life-long correspondence.

Jan Łukasiewicz on Induction: Based on His Letters to Heinrich Scholz from 1943 and 1944

- Gabriela Besler

In Sammlung Scholz (Universitäts- und Landesbibliothek Münster, Münster, Germany) there are six Jan Łukasiewicz's (1878–1956) letters written to Heinrich Scholz (1884–1956) and nine copies of Scholz's letters to Łukasiewicz. At least seven letters are lost.

I will concentrate on four of Łukasiewicz's letters written during World War II, at the turn of 1943 and 1944. Parts have already been published in Polish and German, but the logical notation has been omitted. They concern the research on induction; Łukasiewicz used there his non-parentheses notation.

Łukasiewicz dealt with the issue of induction in the pre-war period; it is well described. However, he did not return to this topic in post-war publications. In addition, none of the surviving post-war letters deals with the issue of induction. The question is why Łukasiewicz did not refer to the results of his logical research obtained in occupied Warsaw. Sometimes some circumstances remain hidden.

Schmidt H.-Ch. Am Busch, K.F. Wehmeier: *On the Relations between Heinrich Scholz and Jan Łukasiewicz*. „History and Philosophy of Logic" 2007.

Schreiber P.: *O związkach Heinricha Scholza z logikami polskimi*. In: *Matematyka Polska w stuleciu 1851-1950*, 1995.

Schreiber P.: *Über Beziehungen zwischen Heinrich Scholz und polnischen Logikern*. In: *Mathematik im Wandel*, 1998.

J. Woleński, J. Agassi*: Łukasiewicz and Popper on Induction*. „History and Philosophy of Logic" 2010, vo. 31, p. 381–388.

Discussion

17 - Epistemology and Politics in Climate Science – 1. Early Cold War and 1970s

Room: **UB.2.147**

Organisers: Matthias Heymann & Dania Achermann

Chair: Fabian Link

Session Abstract:

The history of science has convincingly shown that science and politics interrelate in many ways. Science bears political qualities, and political contexts inform scientific development and understanding. Climate science is an obvious case and provides many examples throughout history. This symposium aims to investigate the multiple relations of epistemology and politics in climate science through history and seeks to understand the nuances of these relations and, in particular, their various impacts in the scientific and social spheres. To deepen our understanding of the relations between epistemology and politics in climate science, we wish to discuss questions such as the following:

- Which features of climate science made it attractive to political interests? Is there something special about climate science in comparison to other disciplines?
- How has politics influenced climate science, and what are the relations between epistemology and the politics of climate science?
- How did the unequal political significance/authority of different scientific disciplines and methods influence the development of climate science?
- How did the relations between politics and climate science affect and influence climate research, as well as the understanding of climate in science and society?
- Which social actors drove political interests in and the politicization of climate science; and what role did climate scientists play in shaping relations with politics?
- How did politicization affect autonomy in and control of climate science? Did climate scientists gain or lose power, autonomy and control over their discipline?

Simulating Climates: the CNRS Phytotron, Biological "Big Science", and Agricultural Modernization in France's Trente Glorieuses

- Lucie Gerber

This contribution proposal examines a little-known chapter in the history of climatology, namely the foundation of a phytotron in France. Created in the early 1950s at the French National Centre for Scientific Research (CNRS), under the direction of botanist and plant physiologist Pierre Chouard, the phytotron launched bioclimatological research into the era of public-funded « Big Science ». Built in Gif-sur-Yvette, it was a technology-intensive, and large research equipment, which included 600 square meters of conditioned culture conditions. It allowed biologists, such was the promise, to artificially generate « all possible climates, from Greenland to the Sahara », in order to study their influence on the behavior and performance of plants. In keeping with the idealized definition of the laboratory, the CNRS phytotron facility was intended to create an enclosed conditioned space for fundamental research, detached from external and incidental disturbances. Notwithstanding this principle of demarcation of a controlled

interior, research there was not impervious to political preoccupations. Based on archival sources, I will confront the project and operations of this facility with contemporary state efforts to modernize agriculture. By resituating the French phytotron in the contexts of reconstruction and decolonization, I will address questions related to the agricultural role that was assigned to it. In addition to phytotronist's discourses, I will look at their research agendas and practices that have fed this justification from the 1950s to the 1980s, focusing on the study of the response of plants to extreme environmental conditions, such as drought and high salinity.

The Role of Swiss Politics in the Establishment of Ice Core Paleoclimatology

- Dania Achermann

As of the mid-20th century onwards, the study of ancient ice was becoming a key pillar in climate research. At this point, Swiss researchers were at the forefront of this new "ice core paleoclimatology". How came that scientists in such a small country were able to play a dominant role in the international climate science community? At this same time, US climate and ice researcher benefitted from ample funding for the sciences that promised to be useful in the geopolitical conflict of the cold war. Denmark–also a small country successful in ice core science–provided access to Greenland, which proved to be a huge experimental ground for glaciology right between the USA and the USSR. Meanwhile, Switzerland was neither a scientific super power nor geopolitically relevant. While being in the midst of Europe and its geopolitical thunderstorms of the 20th century, but spared active war involvement, a specific cultural and political identity was actively fostered by the government. In my presentation I will analyse such political contexts in order to explain why ice core paleoclimatology thrived in Switzerland. I will show how the excitement about nuclear power, the narratives of lake dwellers as ancient ancestors and the Alps as centrepiece of the Swiss identity influenced funding as well as the choice of methods.

Science Diplomacy and Politics: Building the Global Atmospheric Research Program

- Matthias Heymann

In 1967, the World Meteorological Organization and the International Council of Scientific Unions launched the Global Atmospheric Research Program (GARP), which lasted until 1982. The program's primary goals were international cooperation and atmospheric monitoring for improving weather forecasting and investigating climatic changes. A primary concern was the establishment of standardized global observation systems and the improvement and international exchange of observational data. Chair of GARP's organizing committee during its crucial formative years 1968-1971 was Swedish meteorologist Bert Bolin from the Meteorological Institute at Stockholm University (MISU). My contribution will focus on the establishment phase of GARP and the crucial roles of a network of U.S. scientists, the U.S. National Academy of Science and Bolin in establishing it. These scientists pursued their scientific agenda very effectively and established it on the highest political levels. Bolin proved an excellent communicator, mediator and organizer. As a high-level officer in the International Council of Scientific Unions, Bolin used his diplomatic skills to tie together diverse scientific and political interests to mobilize intellectual and material resources for the establishment of the largest international atmospheric research program. The interests in GARP focused on numerical weather prediction and its data needs. Bolin, in addition, pushed recognition and consideration of environmental issues such as rising CO_2 levels and global climatic change. The contribution is based on the evaluation of Bolin's original correspondence found at MISU.

"They Have Left their Cattle and Sometimes even their Babies": The Moral Climatology of Famine in the 1970s Sahel

- Eleanor Shaw & Robert Naylor

In 1972, a widespread famine in the Western Sahel region of Africa hit international headlines. It rapidly became clear that Sahelians and their livestock were enduring extreme suffering and death due to a lack of food. Within a year, the famine became associated with local and global climatic change narratives. This climate attribution thesis silenced indigenous voices, obscured the impact of extractive colonialism during discussions of causes of the famine, and contributed to perceptions of the inevitability of Sahelian deaths. We examine three key locations of this narrative construction: Anglophone academia, Anglophone media, and selected NGOs. In colonial discourse, the moral climatology applied to the Sahel portrayed the region as incapable of supporting life and cast the inhabitants in moral terms. With the transition from colonial to postcolonial power came a new political context and a shift in the global climate discourse from static climatic determinism to dynamic climatic determinism, with the cause of inhabitability becoming climatic changes rather than an inhospitable static climate. Alongside these transitions, there was also a continuation of the moral climatology of colonial discourse, seen for example in the blaming of the inhabitants of the Sahel for causing desertification in the region due to overgrazing their livestock. The conceptualisation of the Sahelian climate as inherently catastrophic, and the suppression of both the conception and practice of Sahelian resistance, led to unbreathable lives and deaths for the people of the Sahel.

21 - Strategies for Cultural Diplomacy in the Countries on the Southern Periphery of the Western Bloc during the Cold War: Greece Portugal, and Spain

Room: **UB.4.228**

Organisers: Marició Janué i Miret & Albert Presas i Puig

Chair: José M. Pacheco

Session Abstract:

The symposium will focus on the strategies for cultural diplomacy in the countries on the southern periphery of the Western bloc during the Cold War stage based on exemplary cases from Spain, Greece and Portugal. The theoretical approach is framed in studies on cultural diplomacy and soft power, which analyse the use by States of culture and science as a political resource in their international relations. An understanding of cultural diplomacy that integrates science, technology, and academic culture in an exemplary manner is adopted.

The original contribution of the proposal is to study the key role of cultural diplomacy for countries other than the major powers, which have received little attention in a historiography focused primarily on the agency of the world's major forces. By discussing the cultural and scientific diplomacy strategies that these peripheral countries developed during the geopolitical transformations that took place during the period under consideration, the Symposium aims to achieve three main objectives. First, to clarify the relevance that these countries gave respectively to cultural and scientific diplomacy in the search for a place in the emerging world of the Cold War. In the same way, the Symposium aims to clarify the evolution of the place that these peripheral countries occupied, both in the Western context and in the international order. At a broader level, the Symposium aims to help clarify the importance of cultural diplomacy and

the projection of soft power in international relations during the Cold War period by incorporating the perspective of the countries on the southern periphery of Western Europe.

Rebuilding Continuity with the West: Spain's Cultural and Scientific Diplomacy in the Post-war (1945-1959)

- *Marició Janué i Miret & Albert Presas i Puig*

The presentation will focus on the use that Franco's Spain made of cultural and scientific diplomacy as a strategic instrument for achieving integration into the Western bloc during the consolidation phase of the Cold War. At the end of World War II, the Franco dictatorship was isolated internationally. Any aspiration of the regime to overcome international ostracism meant diluting the fascist content of its image from the previous stage. Taking advantage of the Cold War installation context, to turn this situation around and cement the relationship with the "civilised" nations of the West, the regime fostered international recognition of the contribution of the traditional Catholic essences of the " Hispanidad" in the common European cultural and intellectual heritage. Cultural and scientific diplomacy acquired priority as an instrument for this, mobilising the resources at its disposal on three levels: human (intellectuals and related scientists), institutional -official or para-official- (CSIC, Institute of Hispanic Culture, CEDI ....), and ideological-discursive. Tensions between the communist and Western blocs led to Spain becoming a key strategic ally of the West in the Mediterranean.

Our aim is to shed light on the contribution of cultural diplomacy to this achievement on the basis of the analysis of three relevant cases: that of the mathematical community, that of the development of physiological optics and nuclear technology, and the development of relations with the Federal Republic of Germany in the humanities and social sciences. In dialogue with the other contributions of the symposium, the presentation aims to incorporate the role of the countries of the southern periphery of Europe in the study of the socio-political, cultural and scientific continuities between the Europe of fascism and the post-war period of the Cold War.

Tensions and Resistance in the Scientific Diplomacy of the Estado Novo after the Second World War (1945-1974)

- *Maria Fernanda Rollo*

Portugal, despite the explicit resistance of the political authorities of the Estado Novo, through its involvement in the Marshall Plan, its involvement in the OECE/OECD, the European Payments Union and the European Productivity Agency, has ensured its integration into the post-war international system and the active presence in the nascent movements of European economic cooperation, followed by the integration into the EFTA and the rapprochement of the EEC. The same international context determined the integration into NATO and INVOTAN, and, after the initial rejection, Portugal's admission to the UN in 1955 and the constitution of the Portuguese representation with UNESCO in 1961. These were the most significant strands that shaped the scientific diplomacy of the period, in combination with the priority given to the colonies (highlighting the action of the Board of Geographical Missions and Colonial Investigations and the creation of several research institutes in the colonies), in a framework of increasing international opposition in the colonial policy of the Portuguese government.

Internally, political and structural tensions and contradictions would be accentuated, in the promotion of a certain type of modernisation and internationalisation of the national scientific system in coexistence with an authoritarian political framework and strongly conservative matrix and a clearly delayed economic and social structure. Institutionally, the most significant initiatives in scientific and academic diplomacy would be in the sphere of action of the Institute for High Culture and, from 1967, of the National Board

of Scientific and Technological Research. This communication will focus on the characterisation and analysis of these initiatives and the tensions they have generated.

Portugal's Scientific Policies in the Period 1945-1960: The Effect of the End of World War II and the Beginning of the Cold War

- Luis Manuel Ribeiro Saraiva

With the end of World War II the political scene changed dramatically, and the Portuguese dictatorship felt menaced. Its sympathies lied with the defeated Germany and Italy, although a link with England was always maintained. Two important facts were influent in Portuguese external policy: the formation of two political opposite blocks, with the USA and the Soviet Union heading each one, soon leading to the Cold War; and the consequences of the discovery of the destruction potential of the atom bomb, and the research for more destructive weapons. For its survival the regime counted on two main items: having the Azores islands, with its strategic value for military bases; and having uranium mines. We will analyse the evolution of Portuguese scientific policy, how the debate with England (and the USA) conditioned foreign support for research. We will analyse the important 1952 reform of the Institute for Higher Culture (IAC), the main institution in Portugal that supported scientific research. Among its changes, it included in its tasks to elaborate a program of exploitation and application of nuclear energy. As a consequence of this new policy, in 1954 the Nuclear Energy Board was founded.

We will also refer the impact that had in Portugal private institutions that supported scientific research that appeared in Portugal in the late 50s, as the Calouste Gulbenkian Foundation in 1956, and of commissions that were formed in direct relation to the Cold War, as the INVOTAN (1959), a structure that dialogued with NATO's scientific committee.

Techno-diplomacy and the Making of the Telecom State in Greece from the1930s to the 1970s

- Yannis Fotopoulos & Stathis Arapostathis

The aim of this presentation is to study how technological infrastructures have reconfigured the Greek techno-scientific state materially, politically, and ideologically. The emphasis is on telecommunication infrastructures during a critical period of Greece's reconstruction following WWII and the civil war, as well as the country's technopolitics during the Cold War era, which was marked by political instability and a military dictatorship. We would like to address the following research questions: What role did foreign technical expertise and managerial advice play in the development of the telecommunications infrastructure, and how did technological transformation shape the Greek State's governance culture? How have technological infrastructures functioned politically and shaped national politics as assemblages of material, technical, knowledge, social, and cultural components? What was the role of technological infrastructures and the imaginary built around them in shaping the transnational politics and the geopolitical place of the country in South Europe.

To begin, we examine Greece's reconstruction and the role of foreign corporations, international aid organisations, and campaigns such as the United Nations or the Marshall Plan, as well as the role of foreign experts in the reconstruction and expansion of telecoms infrastructure (mainly for telephony). We argue that local experts in conjunction and collaboration with foreign experts promoted techno political agendas that were deemed critical for the integration of Greece in the group of capitalist European countries. Second, we examine the period of the Greek dictatorship (1967–1974) in order to decipher the role of the country's first satellite communication station and its role in both domestic and international politics. We argue that satellite infrastructures functioned politically in promoting junta's imaginary of the transformation of Greece into a technological hub (telecom, energy and transportation) in East Mediterranean and the Balkans.

24 - Science, Religion and Atheism - 1
Room: **AW.1.125**

Organisers: Kostas Tampakis & Jaume Navarro

Chair: Kostas Tampakis

Session Abstract:
Recent scholarship has explored the context and agendas of John W. Draper, Andrew D. White and their promoters showing that the so-called conflict thesis was not so much a pro-atheistic movement, not even an anti-religious campaign, but an attempt to reform Christianity from within, or a broad notion of religion in Western, mostly Anglo-American settings. While the field of science-and-religion has, in the last few decades, benefitted from a new array of approaches, broadening the geographical scope of such studies for instance, the organizers of this panel feel that there remains to be done a serious exploration of the history of explicit atheism as part of the historiography of science-and-religion.
The spread of "scientific materialism" or explicit "scientific atheism" were part and parcel of the development of Marxist ideologies, for instance. But there were other forms of materialism and atheism that took "science" as their ideological alibi. By so doing, they not only shaped a very specific notion of "science" but also transformed, at times, atheism as a new form of religion. Recent examples such as so-called "New Atheism" may be seen as only the re-edition of an old project of proving the non-existence of God from the activities, theories or institutions of science.
This panel explores the ways science and atheism have related to each other in the last two centuries, with a particular interest on how these two notions have shaped each other as seen by scientists, historians, philosophers, politicians, popularizers and religious authorities.

Ideological Conflict: Antonio Gramsci on Science, Religion and Italian History
- Neil Tarrant
Various historians have used concepts such as hegemony and ideology developed by Antonio Gramsci to analyse the history of science, but his specific arguments about the history of science and its impact on Italian history have been less influential. In this paper I consider why. At several points in his *Prison Notebooks*, Gramsci referred to the relations between science and religion. His arguments were framed in relation not only to Marxist economic determinism, but also the Italian idealist philosophical tradition, especially the work of Benedetto Croce. Gramsci considered both science and religion to be ideologies and argued that at several points in history the former was eclipsed by the latter. Although an atheist, Gramsci nevertheless assigned religion an important role in his interpretation of Italian history. Rejecting Croce's belief that the Renaissance was the driving force of Italian history, Gramsci associated progress with the Protestant Reformation and accused the Catholic Church of stifling Italian scientific development. Adriano Prosperi has argued that the events of the Second World War shook historians' faith in traditional narratives of modernity that associated progress with Protestantism and encouraged even Marxists to consider the Catholic Church's role in creating modern Italian society. I suggest that this development encouraged historians such as Prosperi to embrace Gramscian tools such as ideology and hegemony, whilst separating them from his specific claims about Italian history. In this manner, Gramsci's reflections on science and religion became marginalised in historical discourse.

"Anti-materialist, but Pro-science": The Construction of a Discourse in Turkey, 1890-1950

- Alper Yalcinkaya

Scholars interested in investigating the relations between science and religion tend to focus on topics like the formation of the universe, the emergence of life on earth, and evolution. Nevertheless, in many historical and geographical contexts, the more comprehensive debate involving the relations between religion and science is that concerning materialism. In public controversies about the "dangers" of particular scientific theories, critics commonly place the blame on materialism rather than on science, and the alleged connection between materialism and atheism is the main issue they address. In this talk, I will provide a framework for analyzing the way in which this logic worked in Turkey, from the late Ottoman to the mid-20th century Turkish cases. Starting in the 1880s, Muslim Ottoman authors gradually built the argument that "European science" could lead young people to adopt materialism and abandon religion, and offered ways to import the sciences while avoiding materialism. This effort gave rise to an emphasis on illustrating the so-called Islamic roots of the sciences, and the construction of a discourse on the religious and moral values a scientist had to have. Analyzing the main "anti-materialist yet pro-science" texts published in the religious periodicals of this period, I will demonstrate that these works constructed novel ways of understanding Islam, commonly drawing more from heterodox, rather than orthodox, traditions. While countering "materialism," in turn, this trend brought Islam closer to a broadly spiritual worldview than a lived religion.

Science and Atheism in Early Twentieth-century Spanish Anarchism

- Jaume Navarro

In 1909, the Catalan anarchist and pedagogue Francesc Ferrer Guardia was executed after a court condemned him to the capital punishment for his supposed involvement in a long-week revolt that took place in Barcelona. Ever since, Ferrer Guardia became a symbol for freethinkers, anarchists, anti-clericals and pedagogy reforms in Spain. Although not a scientist, he has often been portrayed as a promoter of the natural sciences through education and an opponent to the religious, mainly Catholic, worldview of some of his contemporaries. Anarchism was, in fact, one of the most influential socialist movement in Spain at the turn of the century, and one that has been, of late, much romanticized by some historians and a number of political activists. Literary men like Federico Urales, Anselmo Lorenzo, Ricardo Mella or the young Pío Baroja were some of the most influential actors in the anarchist movement, often using science and scientific topoi in support of their political agenda, their anti-clericalism and their atheism (think, for instance, of Baroja's "The Tree of Science" or Mella's translation of Kropotkin's "Modern science and anarchism").

In this paper I suggest a preliminary study of the ways in which atheism, as opposed to mere naturalism, agnosticism or practical anti-clericalism, was characterized by the leading Spanish anarchists at the beginning of the twentieth century. I shall pay particular attention to the framing of atheism in relation to the modern sciences, and vice versa, taking into consideration that hardly any of them were practitioners of the sciences.

Discussing the Gender Aspect of the Relationship between Science and Religion/Atheism

- Evangelia Chordaki

The discussion regarding the relationship between science and religion is well established in the field of the History of Science. Whether treating them as distinct domains of society or through their integration since the emergence of the so-called natural philosophy, the fruitful dialogue has undoubtedly offered significant insights both from national and international perspectives. The discussion becomes even richer

if atheism, non-religiosity, and secularity become part of the analysis, as "non-institutional forms of religion […], which they do not merely describe the world, but they want to change it" (Mahlämaki, 2012: 58). Thus, by moving forward from the "conflict thesis" to the "complexity thesis," we can prioritize the crucial impact of power and authority and re-approach (natural) sciences as a battleground between the Church, atheism, and the scientific communities at certain times and places (Project ATHOS). But what does an analysis of this battleground as a gendered phenomenon offer the discussion? While gender as an analytical category has been studied either concerning religion/atheism or science, the current paper explores the role of gender in the intersection of those notions. I argue that the contribution of such an approach can offer a more symmetrical analysis, revealing new paths of explanation and raising numerous research questions. Keeping in mind that (white) males dominate both science and religion (Hyman, 2010) and even atheism (Finger, 2017), a shared feature of these social activities is already present. But a gender analysis moves even far from maleness and femaleness. It includes the study of gender in the performativity of those activities, the performativity of gender within these activities, and the construction of masculinity and femininity. The study will be staged in two parallel axes: On the one hand, I will examine the theoretical possibilities and/or limitations of the proposed approach, while on the other hand, I will discuss the Project ATHOS, situating the theoretical scheme in a specific context: the Greek society of the 20th century.

28 - Scientific Temporalities in the 19th and 20th Centuries - 2

Room: **AY.2.107**

Organiser: Staffan Bergwik

Chair: Staffan Bergwik

Session Abstract:

Since the 1990s, history of science has been dominated by an interest in the spatial dimensions of knowledge. Local places and "knowledge in transit" have been recurring analytical themes to describe the circulation of knowledge. This symposium contributes to a reorientation in the field towards an historical analysis of the temporality of knowledge. Today, the timescales of science, society and environment emerge as pressing scholarly issues against a backdrop of an ongoing temporalization, mainly driven by discourse on contemporary and convoluted crises of climate, health and democracy.

This symposium aims to explore scientific temporalities in the 19th and 20th centuries. The papers explore how multiple timescales in nature and society have been represented and synchronized in scientific knowledge making. We investigate influential ideas about chronology, origin and archives in nature and history writing. Moreover, the papers discuss the temporality of knowledge making itself. How has the rhythm of knowledge been perceived and represented? Furthermore, the papers engage with a period when the modern sciences were increasingly integrated in state infrastructures of the Western world. Accordingly, a crucial concern is the relationship between timescales in science, the environment and politics. How have timescales of knowledge making played out against the temporality of society and the natural world? Departing from studies of time within the humanities, the panel will explore the temporal logic of human and planetary timescales in the 19th and 20th century sciences, with repercussions on both science and contested political issues.

The symposium seeks to facilitate a conversation between history of science and neighbouring fields.

Accordingly, it brings together scholars from history of science, environmental history and history of the humanities.

The Little Tools of Timing: Co-modifying Nature-times with the Times of Politics

- *Kristin Asdal*

Politics of nature is inextricably linked to time-work. Not only is it a time-issue, but also a timing-issue; about working upon time and about having different modes and versions of time to meet: nature-times in encounters with the times of politics and the 'little tools' that do such co-modification work. In combining environmental humanities and the history and politics of science, this paper suggests turning time into one of our key objects of inquiry - and to take this to include the means and tools that set nature-entities on the move and enable them to become part of political procedure, parliamentary settings and democratic as well as economic practice. In showing this, the paper argues that parliaments are not such exclusively human affairs as they are often thought to be. Empirically the paper delves into these issues by analyzing the controversy over whaling which surrounded these large animals in the late 19th century as well as the more contemporary efforts at seeking to time the Atlantic cod to transform it into a farmed species. More overridingly the paper argues that we cannot understand the history and politics of nature without grasping the time-work that it involves.

The Rhythm of Knowledge: René Dubos and the Multiple Temporalities of Science and Society in the 1960s

- *Staffan Bergwik*

While cultural theoreticians have devoted plenty of attention to ideas about "the expanding present", "synchronicity" or "temporal regimes" such ideas have had very little impact on history of science. This paper starts from ideas in "time studies" as a branch of the humanities to grapple with multiple temporalities co-existing in the fabric of science. The paper uses French-American microbiologist, environmentalist and science writer René Dubos as a case in point. A well-known figure in environmental history, he wrote extensively on science, society and the environment, and became famous for the maxim "Think globally, act locally" but also for his Pulizer Prize-winning book *So Human an Animal: How We are Shaped by Surroundings and Events* from 1968.

The paper asks how tempos of knowledge making were portrayed by Dubos. How long did knowledge take? How long did it last? What was the temporal logic of knowledge: Painstaking and extended series of observations or sudden flashes of insight? Moreover, the case of Dubos includes questions of how the temporality of knowledge making played out against the tempo of the environment, of humanity and of society. As society became increasingly scientific and the environment a growing societal concern, how were different temporal scales and durations portrayed in Dubos' public writings on science? And how did his ideas about temporality resonate with larger discourses on science in the 1960s and 70s?

Planetary Timekeeping: Paleoclimatology and the Rise of Proto-Anthropocene Knowledge, 1960-1990

- *Erik Isberg*

In the last decade, the Anthropocene concept has permeated scholarly discussions across the natural sciences and the humanities. For history, the conflation of natural and human timescales that the Anthropocene brings with it has sparked new theoretical debates on temporalization, synchronization and the very properties of historical time itself. Even though it stands clear that scientifically produced

timescales from the geosciences have entered theoretical and methodological frameworks in history and the humanities, it stands less clear where all these timescales came from in the first place. In this paper, I seek to historicize the recent turn towards integrated human-planetary timescales by following the rise of paleoclimatology in the postwar era. The elaborate work within paleoclimatology to reconcile different proxy archives, such as ice cores, deep sea cores and lake sediments, enabled new kinds of integrated human-planetary histories well before the Anthropocene was coined in 2000. The early attempts to reconcile planetary and human timescales are identified as forms of proto-Anthropocene knowledge (Sörlin & Isberg, 2021) and bring attention the longer history of conceptualizing human-planetary temporalities in the Twentieth century. By turning towards the scientific production time and temporality, history of science can provide a deeper understanding of how planetary pasts shape the political present.

Discussion

30 - Astronomers' Histories of Astronomy: Practices around the Paris Observatory (18th-19th Centuries) - 2

Room: **AY.2.108**

Organisers: Giorgio Matteoli, Matthieu Husson, Christophe Schmit

Chair: Matthieu Husson

Session Abstract:

Astronomers of different periods and cultures ordinarily relied on astronomical works made in some cases several centuries before, in contexts very different from that of their own practices. Accordingly, they may discuss the theoretical, instrumental or observational basis on which these works were initially built or the documents and intermediaries through which they were transmitted to them. In particular situations, these discussions may develop into consistent attempts at writing different kinds of history of astronomy.

Analyzing the changes in the historiographical discourses thus produced by astronomers is a promising venue of research which may for instance allow us to track changes in the practices of astronomers as well as the relations of these changes to broader institutional and political dimensions. The symposium seeks to explore this general issue focusing on the historiographical practices of 18th and 19th centuries astronomers connected to the Observatoire de Paris. From Cassini to Delambre, including Delisle, Le Monnier, Lalande and many others, astronomers connected to key political scientific institutions in France Observatoire de Paris, as well as the Académie royale des sciences de Paris, produced differents historiographical discourses on astronomy. These discourses reflect the perspectives of these key political scientific institutions as well as some of the deep transformation astronomy practiced in Europe underwent in this long 18th century with echoes linked to the enlightenments on a global scale.

Thus the presentations of this symposium will address issues including:

- the types of sources, their uses by the astronomers and how they access and collect them;
- the topics and questions their historiographical discourses address, and the kind of historical actors they consider;

- the conceptions of the discourses, of historical causality or temporality, and if so what issues they are connected to issues broader than the history of astronomy strictly.

Lalande on Ancient Astronomy and its Applications

- John Steele

The mid-18th century saw considerable interest in determining a value for the secular acceleration of the moon, in particular through the pioneering work by Richard Dunthorne and Tobias Mayer. The secular acceleration is a small effect that can only be detected over long timeframes. Its study, therefore, relied upon the use of ancient observations of eclipses, of which only a handful remained. The biggest source of these 'sacred remains of antiquity', as Dunthorne referred to them, was Ptolemy's Almagest. But they came with problems: Could the ancient sources be trusted? How should they be interpreted? and Where were they made? In 1757, Lalande published a review of previous work on the topic and proposed his own value for the secular acceleration. Alongside the technical analysis, Lalande commented on the reliability of ancient astronomical writers, with Ptolemy coming in for particular ire. Lalande returned to the topic of ancient astronomy in Book 2 of his Astronomie, first published in 1764 with second and third editions published in 1771–1781 and 1792. The paper will examine Lalande's study and use of ancient astronomy, and address the question of whether Lalande's study of the history of astronomy influenced or was influenced by his use of ancient observations to determine the moon's secular acceleration.

Historiographical Practices in the *Encyclopédie*: The Case of D'Alembert's Article "Astronomie"

- Colette Le Lay & Christophe Schmit

The Encyclopedia of Denis Diderot, Jean Le Rond D'Alembert and the Chevalier de Jaucourt is a major work of the eighteenth century that combines knowledge derived from compilations of old and recent sources with living knowledge produced at the very moment of the book's composition. The article "Astronomy" written by Jean Le Rond D'Alembert, which is devoted almost exclusively to the history of the discipline, illustrates this dichotomy. It bears witness to the historical knowledge of this science in the West in the mid-century, and also reveals the historiographical practices of the time. This paper will highlight the salient features of this history, analyze these practices and the use of sources, and contextualize D'Alembert's account, notably by evoking other works by astronomer-historians of the 17th and 18th centuries, in particular by members of the Paris Observatory, and by comparing some elements of it to other encyclopedic writings of the century.

Historiography of Astronomy and the Birth of a General Historiography of Science: The Case of Jean-Étienne Montucla

- Giorgio Matteoli

As it is widely acknowledged, Montucla's *Histoire des mathématiques* (1758) stands out as the first attempt to write a comprehensive history of science from a general point of view, i.e., the one provided by the mathematical sciences. However, very little is known about the context of emergence and publication of Montucla's work, the cultural arenas it was meant to intervene on, and the epistemological and historiographical agendas by which it had been prompted. How did Montucla decide to dedicate himself to the (then not so popular) historical approach towards the sciences? Who were his closest role models in this enterprise? By retracing the earlier stages of Montucla's intellectual development (from the Jesuit *Collège* of Lyon and the Academy of Toulouse up to his arrival in Paris at the beginning of the 1750's, where he started his collaboration with the *philosophes* and most notably with D'Alembert) I will

point out the role played on his education by some astronomers sharing a keen interest in the history of their discipline. One of them (the famous founder of the St. Petersburg Observatory, Joseph-Nicolas Delisle) was even planning to write a general history of astronomy that remained unaccomplished. As I will show, these mentors and friends would have figured in the *Histoire* of 1758 as direct sources or hidden inspiration, providing a strong link between the historiography of astronomy and the nascent general history of science as a literary genre.

39 - The Politics of Data, Environments, and Infrastructures - 2

Room: **AW.1.121**

Organisers: Matthew Adamson & Doubravka Olšáková

Chair: Doubravka Olšáková

Session Abstract:

One of the most prominent topics in science diplomacy is knowledge infrastructures: their creation, their upkeep, and their implications for international relations, resource conservation, and environmental stability. Historians have discovered increasing evidence across time periods and scientific disciplines that geopolitics profoundly informs data collection and sharing (Aranova, 2017) as well as establishes the conditions and possibilities of the study of world systems (Edwards, 2017). This panel, sponsored by the DHST Commission on Science, Technology, and Diplomacy (STAND), extends this line of inquiry by considering milestones of historical knowledge infrastructures, international environmental and natural resources surveying, cartographical establishments, and astronomy and space science. The insights of these historical researches are of inestimable significance in our current period of big data, climate change, and biosphere degradation. This panel provides the sorts of diverse perspectives on these global infrastructures necessary for furthering historical research and indicating the relevance of that research to as wide an audience as possible. It shows that data is never “raw”, but a result of diplomatic as well as scientific initiative, and therefore a matter of considerable importance to those studying science diplomacy.

The Political Use of Science in the Diplomacy of the Scramble for Africa, 1875–1891

- Daniel Gamito-Marques

The purpose of this communication is to discuss the influence of Portuguese governmental and private scientific institutions in the promotion of scientific studies relevant for the negotiations over the partition of Africa in the late nineteenth century. In the 1870s, economic and political interests coalesced to make the colonization of Africa an appealing undertaking, technoscientific advances being crucial in this context. Portugal had enormous colonial ambitions in Africa, despite being a small European kingdom of limited financial resources. Portuguese colonial claims were at first presented in terms of its historical priority in various regions, but as competition mounted in the 1880s new strategies had to be developed. In 1883, a Cartography Commission was founded in the Ministry of the Navy and Overseas Territories, with the aim of coordinating the production of maps useful to plan colonial expansion in Africa and negotiate future borders with neighboring colonial rivals. Founded eight years before, the private Lisbon Geographical Society also tried to influence such colonialist plans according to the interests of its

members, who did not necessarily align with the Portuguese executive. In this communication, I will discuss how this interplay of forces led to the organization of different types of Portuguese expeditions to Africa, and the extent to which the scientific knowledge gathered from them was used in the colonial negotiations conducted in the international arena to gain advantage over rival colonial powers.

Ecological Diplomacy between Spain and Saudi Arabia: The Protection of Birds of Prey in a Hunters' Society

- Sergio Arias Ramos

During the last decades of the Francoist dictatorship in Spain, political pressures from various fronts prevented certain natural spaces and wild species to be transformed and exterminated despite strong developmentalist projects. This relative success of the environmental conservationists cannot be understood without the mediation of international forces. Scientists, early environmentalists, and hunters, as well as international aristocrats and businessmen, worked together through diplomatic channels to stop projects in wild spaces and also to transform hunting laws. One of the most significant achievements is the full protection of all species of birds of prey in 1966. It directly opposed the still operating state bodies that promoted and subsidize the extermination of most wild carnivores (Juntas de Extinción de Animales Dañinos y Protección de la Caza). While several actors were instrumental in this shift from extermination to protection, I would like to emphasize the environmental broadcaster Félix Rodríguez de la Fuente (popularly known as Félix) and the king of Saudi Arabia Saúd bin Abdulaziz. Both were introduced to each other in 1962 by General Franco himself, who wanted Félix to capture and give a goshawk to the Arabian monarch, a well-known experienced falconer. After many hunts together, the king and the naturalist became unexpected friends. Rodríguez saw an exceptional opportunity to convince the dictator to stop animal extermination programs: four years later all birds of prey were not allowed to be hunted anymore in Spain. In this paper, I explore this case within a broader game of international diplomacy by which Spanish environmentalists achieved important milestones in the protection of natural spaces and species in exchange for international legitimacy to the Francoist regime. The socio-political peculiarities of the dictatorship forced the environmentalists to adopt their own adaptive strategies. While these strategies were effective during the Franco rule, they ultimately disappeared with the arrival of Spanish democracy.

'The Domination of the World:' How Physical Environmental Knowledge Became Vital to U.S.National Security and Foreign Policy Aims in the Early 1960s

- Ronald E. Doel

In March 1960, the U.S. Central Intelligence Agency's Geographic unit produced a remarkable document. Entitled "Environmental Research and its Implications to Long-Range Power Positions," CIA analysts argued that Soviet scientists, technologists, and political leaders recognized the importance of studying "the physical environment of the entire earth as an element in the power struggle compared with that of the Free World." A specific worry—spurred by Western recognition of Soviet achievements during the International Geophysical Year of 1957-58—was that the Soviet researchers would outrace the West in developing "a capacity to forecast or prognosticate the occurrence of physical environmental phenomena, whether for economic competition or for military operations." But even more important was the fact that this analysis became part of a major Eisenhower Administration initiative, spearheaded by the National Security Council, to determine how "the U.S. and the Free World Coalition could meet the Soviet-Communist threat" –and influence Western leadership in the decade to follow. At the start of Eisenhower's administration, NSC analysists viewed "Power Position" issues solely in terms of nuclear weapons capacities; the secret early 1960s deliberations involving environmental knowledge represented

a dramatic expansion of factors now viewed as crucial in reckoning (as one U.S. analysist put it) whether "time was on our side" in the East-West conflict. Drawing on recently declassified documents from the CIA as well as the Eisenhower and Kennedy presidential administrations, this paper will explore emerging questions: how seriously were environmental factors regarded as central to national security, intelligence-gathering, and diplomacy by U.S. administrations; and what effect did highest-level focus on these issues have on the production of knowledge about the planet's physical environment, including climate change?

52 - Expertise in the Low Countries in the Early Modern Period - 2

Room: **AY.2.114**

Organiser: Maarten Van Dyck

Chair: Steven Vanden Broecke

Session Abstract:

Expertise is often portrayed as a special property possessed by a select group of people, but so-called relational approaches treat it instead as "a network connecting together not only the putative experts but also other actors, including clients and patients, devices and instruments, concepts, and institutional and spatial arrangements" (Eyal 2013, 873). On this alternative view, the establishment of expertise not only depends on the development of specialized knowledge, but also requires extended processes of negotiation on the adequate framing of the problems to which such knowledge provides the answers. Different definitions of the nature of a problem can lead to very different expectations about the characteristics of adequate answers. Accordingly, the relevance of certain types of specialized knowledge is also the outcome of prolonged social and material struggles that precede the relative stabilization of a network of expertise. In this symposium, we will analyze the construction of networks of expertise in the Low Countries in the Early Modern period. We will look at how actors were actively exploring novel ways in which purported knowledge could be shared and be put to work in new social and epistemic places, how they were shaping the expectations of the new audiences that they were actively constructing, and how these audiences were trying to find out how to decide whom to trust.

"Conversing with Strangers": Trust, Patents, and Brokered Expertise in the Seventeenth-century Dutch Republic

- *Marius Buning*

This essay tells the story of the English inventor William Wheeler (?-1653) and his attempt to obtain a patent in the Dutch Republic for the invention of a scoop wheel. Based on the details of this case, the essay demonstrates that there was no direct line from ignorance to the objective validation of knowledge by experts when it came to the assessment of early modern technological innovations. Instead, "expertise" was at all times highly context-specific and dependent on social, religious, and linguistic ties and barriers. The networks emerging from these relational systems, varying markedly in terms of openness and exclusivity, determined the kind of expert knowledge produced. The aim of this essay is to develop and explain this point by using different archives that highlight the various avenues through which expertise about a single invention could be negotiated, while paying close attention to the role brokers played in that process as well. By focusing on the doings of an inventor who had to navigate between Dutch and English interests during the Civil War, the essay not only provides an unusual insight into the workings of the patent system in the mid-seventeenth century, but also raises new questions in the field of political epistemology.

Public Affairs: Claiming Mathematical Competence in the Dutch Republic

- Fokko Jan Dijksterhuis

Being a mathematician in Dutch Republic was basically one's own choice. Anybody could call themselves a 'mathematician' as there were no official requirements and restrictions. No guilds or licenses existed, nor were specific training or exams required to claim mathematical competence. Only when applying for an office like provincial surveyor, an exam was taken - but again, there were no requirements regarding mathematical training to enter the exam. Mathematics in the early modern low countries was a free market that anybody could enter whatever their level of numeracy. It was a competitive market, where reckoning masters, navigation schools, advisors promoted their skills to attract pupils, patrons, and so on. Mathematicians had to decide reciprocally who was capable or an 'on-wissen wiskonstenaar'. This resulted in public debates about mathematical expertise, challenges and pamphlet wars where one could claim that some pretender was in need of proper spectacles, a 'bril voor de Amsterdamsche belachelijcke geometristen' (1663). The question who was capable thus became a public affair, where consumers and authorities were informed about what it took to be a mathematician. Such debates are enlightening, because here assumptions about mathematical competence were explicated and discussed.

Experts and Amateurs at Work: Observing, Depicting, and Consuming Plants in Early Modern Northern Europe

- Jaya Remond

My paper examines the cultivation of plants and the pictorial productions that arose around it (ranging from botanical imagery to floral pattern books) as arenas where experts and amateurs connected. Aimed at a wide and varied audience, these productions involved different types of expertise and skills--scientific and artistic--owned, for instance, by botanists and images-makers. Using floristry and floral imagery as a framework, I aim to clarify and historicize the categories of ‘expert’ and ‘amateur’: for if the latter is well documented in early modern sources in different contexts (‘lovers of the arts’, ‘lovers of flowers’), the former is harder to pin down. Thus, this paper will explore the ways in which categories of experts and amateurs not only connected and informed each other, but also how they could productively overlap.

Discussion

55 - The Perils and Promises of Prediction in Science and Science Policy - 1

Room: **AW.1.126**

Organiser: Theodore Arabatzis

Chair: Theodore Arabatzis

Session Abstract:

In the realm of public policy, decisions rely heavily on the ability to predict future events. Since scientific knowledge is the primary tool for making predictions, scientists often take upon themselves the role of advisor to politicians, policy makers, and the wider public as well. Prediction, however, is not a concept with a fixed meaning. Rather, it has a historical character and has evolved over time. Moreover, the meaning of ‘prediction’ varies across different scientific fields. Although the role of prediction in the

sciences has been a subject of considerable historiographical and philosophical debate, the historicity of prediction has not been systematically addressed. Furthermore, few studies have delved into the ways scientists derive and use predictions or into the particularities of predictions in different scientific fields and their role in policy making.

The aim of this symposium is to address these neglected issues historically. It is part of a project on the perils of prediction in the physical sciences (http://perilsofprediction.gr/), whose aim is to investigate the many faces of prediction in scientific practice and public policy, to explore its significance in different fields, and to historicize its character and epistemic value.

The questions addressed by the contributors include the following:

- How is prediction defined/understood in different scientific fields and in different historical periods?
- What counts as an adequate/successful prediction in different sciences? How are criteria set for evaluating the quality of a prediction?
- How does prediction bear upon policy making? What happens when different scientific communities make competing claims of exclusive expertise on the prediction of a phenomenon?

These questions will be addressed through historical case-studies of prediction in meteorology, volcanology, ecology, and seismology.

Who Predicts? Dutch Storm Warnings and the Nature of Weather Forecasting 1860-1920

- David Baneke

If the weather forecast predicts an 80% chance of rain, few people will be able to tell exactly what that means, but we do know how to act. We bring an umbrella and make sure we have a plan B for outdoor activities. And if it does not rain, we may make cynical jokes about the weather service, but we generally accept that this is no reason to write off meteorology as a whole. In other words: weather forecasts are a remarkably successful example of how people can deal with uncertainty in a fairly robust forecast.

In this paper, I want to examine how we have learned to do this collectively. I will do that by analyzing the development of storm warnings in the Netherlands from 1860 to about 1920. The storm warnings were started by C.H.D. Buys Ballot, who had very specific ideas about the nature and practice of weather forecasting. I will analyze his ideas, and follow the development of the storm warnings from the perspective of scientists as well as users: sailors and fishermen.

It took time for the storm warnings to gain the trust of sailors, and even more time before they paid routine attention. Less obviously but equally importantly, it also took time for meteorologists to find a suitable format for the storm warnings, and to learn what kind of expertise they could expect from their users. Studying this case will contribute to our understanding of how scientific weather forecasts became part of everyday life.

Untamable Volcanoes: The Place of Non-predictive Sciences in the Public Arena

- Joseba Pascual Alba

The geological sciences deal with vast time-scale and model natural 'epistemic things' (Rheinberger, 1997) which are extremely random and unpredictable. As historical scientific objects, volcanoes have a hybrid nature: they are fleeting but stable, observable and hidden (Arabatzis, 2011). They are a particular case of untamable phenomena (Hacking, 1990).

On September 19th 2021, at lunchtime, the people of the Canary Island of La Palma witnessed a volcanic eruption. Some geologists had previously said that there was only a 20% chance of a volcanic reactivation.

While people are used to trusting in numbers (Porter, 1995) and the media and policy makers need predictions, volcanologists actually move through the quicksand of unpredictability (Kampourakis & McCain, 2020). Geological models seem to be heuristic, rather than predictive tools (Oreskes et al., 1994). In the 'Cumbre Vieja' eruption, volcanologists were asked to explain why the eruption was happening, why it was not accurately predicted and why they could not foresee when the end would come. And yet, they were constantly in the media.

My general aim is to use the tools of integrated HPS and cognitive and ecological history in order to understand better the 'Cumbre Vieja' episode. Particularly,

a) to enquire how scientists dealt with that complex and unpredictable phenomenon: I will argue that *Interdisciplinarity* and the superposition of *styles of thinking and doing* were simultaneously shaping volcanological practice (Hacking, 2012; Ruphy, 2016);
b) to shed light on the relations between Spanish scientists, policy makers and ordinary people during the eighty-five days of the volcanic activity.

Prediction in the Wild

- *Alkistis Elliott-Graves*

The traditional approach to prediction, established in 20th Century Philosophy of Science, does not work as well for disciplines such as ecology and climate science, which have a high frequency of applied predictions, that is, predictions aimed at intervening on the world so as to prevent, mitigate or solve a certain problem. Applied predictions tend to fall short of the criteria historically associated with predictive success, in the sense that they are not sufficiently accurate sufficiently often. The aim of this talk is to re-examine the historical account of prediction and how it relates to the context of applied science. I will examine the case of the kōkako, a landmark example of successful conservation in New Zealand and show that the scientists involved in this project were able to increase the predictive accuracy of their models by decreasing the level of precision. I will argue that this example shows that imprecise predictions can overcome two traditional criticisms levelled against them: (i) that they cannot aid in the model selection and improvement and (ii) that they cannot support effective interventions in practical decision making.

Scientific Uncertainty and Decision Making: The Case of Earthquake Prediction

- *Iraklis Katsaloulis*

Scientists have put a lot of effort in order to mitigate earthquake hazard, and they have done so in various ways. One of those ways is earthquake prediction, a scientific practice with a rather recent history, commencing in the 1960s. In the six decades that earthquake prediction has been practiced, the interaction between scientists, politicians and the wider public has been tumultuous. The feasibility and utility of earthquake prediction have been heavily debated. A number of questions regarding earthquake prediction research and political decision making have been raised: How can decisions be taken in light of scientific uncertainty? What is the required accuracy for an earthquake prediction to be useful? Are there two distinct stages of decision making, one related to risk assessment and another related to risk management, or are the boundaries between these two blurred in real life? In the beginning of the 1980s a candidate method for short-term earthquake prediction was proposed by a group of Greek scientists. It soon became the subject of a fierce controversy which lasted for more than two decades, and unfolded in the scientific community and in the public sphere as well. Due to the public character of this debate numerous interventions of scientists, politicians, and policy makers in newspapers, TV and radio broadcasts have been recorded. I will use these sources to investigate historically the questions raised above. I will argue that the Greek case is particularly suited for understanding the difficulties involved in earthquake prediction policy.

74 - Global Animals: The Barcelona Zoo in Transnational Perspective

Room: **UA.4.222**

Organiser: Oliver Hochadel

Chair: Raf de Bont

Session Abstract:

The Barcelona Zoo (founded in 1892) seemed to be a deeply provincial institution in the first half of the twentieth century. With an area of only 2 hectares, located in a corner of the Parc de la Ciutadella, it did not arouse any interest abroad. Even one of its directors called it "the most modest Zoo in Europe". By the end of the century, the situation had changed completely: the zoo's surface had grown to 12 hectares, but more than that, it was well known around the world. An albino gorilla from the Spanish colony of Equatorial Guinea put the Barcelona Zoo on the global map in 1967: Snowflake.

This session asks what objects, practices and ideas circulated between the Barcelona Zoo and the "rest of the world". What kind of relationships did it form with other zoos? Which networks did Catalan naturalists insert themselves in? In what ways were animals and information exchanged? How did these contacts impact on the day-to-day management of the zoo and the scientific research conducted there. The four papers will analyse the animal trade, journeys abroad, and personal contacts, among others.

Using new historiographical approaches such as transnational history, this session tries to take a fresh look at the Barcelona Zoo. The hypothesis is that the Barcelona Zoo has never been an isolated place, even in the first decades of its existence. At the same time, we propose to outline the changing epistemological and economic hierarchies that existed between the Barcelona Zoo and other zoos that profoundly marked these exchanges" in the course of the twentieth century.

Fishy Deals: Francesc Darder and Intercontinental Fish Farming around 1900

- Laura Valls Plana

In 1909, under the direction of Francesc Darder, the "Laboratori ictiogènic" was inaugurated at the Barcelona Zoo. Its purpose was to breed different species fish -both native and exotic-, that would then serve to "repopulate" Catalan rivers and lakes. Since then, fish farming has been introduced in Catalonia through the "fish festivals", which took place in various places to carry out the mass introduction of fish. This scheme must be understood in the international context of fish production, which, especially since the early twentieth century, has shown increasing interest in alien species to improve native fish resources.

Darder had a special interest in Chinese fish farming and promoted the acclimatization of various Asian species such as the golden carp, the "Hi-Goü carp" of China and Japan, the green tench of Russia and the red of Mongolia. Of the Americas, the most praised species in Europe was the rainbow trout. Darder considered it "the tortilla of becoming, ... a precious acquisition to repopulate our waters." The presentation will focus on the circulation of these exotic species, relating the global traffic of goods and the local context of the watercourses where they were introduced. Among other things, we want to reflect on the implications that the exotic component could have on the conception of a "genuinely" Catalan nature that was then being built in the Ciutadella park.

The Transnational Vision of a Catalan Nationalist: Pere M. Rossell i Vilar and the Reform of the Barcelona Zoo in the 1920s

- Oliver Hochadel

Pere M. Rossell i Vilar (1883-1933) is well known as a promoter of "scientific" livestock farming and a left-wing politician. Because of his ideas of a “Catalan race”, with respect not only to animals but also to human beings, some historians have called him a “modern racist”. Much less known is his important role in the early history of the Barcelona Zoo. For years Rossell was advocating a radical reform of the small zoo. In 1920 he participated in an opposition for the direction of the zoo after the death of Francesc Darder in 1918. His plans for the zoo differed radically from Jeroni Darder, with whom he competed (and with whom he shared responsibilities in running the zoo in the 20s). Rossell knew the international scene very well from his reading and from his visits of zoos in France, Germany, and Switzerland after World War I. He was a supporter of the Carl Hagenbeck’s "zoo revolution" (enclosures without bars) and the ideas of the French zoo reformer Gustave Loisel on the modernization of the zoo.

This talk will emphasize how Rossell obtained information about zoos, and how he intended to use this information for the reform of the Barcelona Zoo. We will discuss how his nationalist and even racist convictions coexisted with his transnational vision of a modern zoo.

From Hagenbeck to Hediger: The International Connections of the Barcelona Zoo during Franco’s Dictatorship

- Miquel Carandell

Since the late 1950s, the Barcelona Zoo, directed by Antoni Jonch i Cuspinera, started to build a dense network of international connections. In the midst of Franco’s dictatorship, and coinciding with the start of a big renovation and transformation of the zoo, these connections improved with a trip to visit different European zoos, from Lisbon to Basel in 1956. With the aim to gather information and ideas for the new Barcelona Zoo the trip was made by Jonch and the architect in charge of the renovation project. Having previous knowledge and interest in Carl Hagenbeck’s zoo concept revolution, Jonch got in touch with the scientific ideas of Heini Hediger the director of Zurich Zoo. Jonch, who visited the Zurich Zoo and probably met Hediger, was, from then on, highly influenced by his ideas, and especially his conceptions of the zoo enclosures and his concept of “zoo biology”.

In this talk I want to reconstruct how these international relations, scientific and architectural ideas influenced the Barcelona Zoo as an exhibition space, an educational institution and a place for scientific research. Moreover, I want to analyse in how far the historical context Franco's dictatorship, that fashioned a double discourse of international isolation and, at the same time, technological and scientific modernity, impacted on these international relations.

Discussion

112 - History of Early and Modern Chemistry
Room: **UA.4.218**

Chair: Frank James

Spain's Scientific Policy: The Case of Paracelsian Knowledge of El Escorial
- *Mariana Sánchez*

In sixteenth-century Spain, Alchemy was an art that had no place in the traditional teaching system and that could be blocked out by the inquisitorial power. However, Philip II was very interested in it, both for the economic perspectives it offered and regarding the medicinal applications from which he expected to personally benefit. Hence, Philip II offered two forms of protection to the alchemical knowledge: the distance from Madrid (that is, its universities and other classical academic centers), and the royal protection, which were both granted in the monastery of El Escorial. A creation of Philip II, El Escorial is a large complex that consists of a library, a laboratory, a hospital, and many gardens. It is a place where alchemical work, and especially Paracelsian work, could be found without inquisitorial censorship. Distillers, apothecaries, and gardeners (coming from various parts of Europe) were able to use knowledge and technics without worrying about their orthodoxy. As such, alchemical works done by Paracelsus and Paracelsians (among which we can name Leonardo Fioravanti, and Oswald Croll) were then able to reach the complex and be used without previous expurgation by the Inquisition. Based on an archive work through a list of alchemical books available in the library of El Escorial, this contribution will deal with the contrast between the scientific policy of almost total closure in the Hispanic world in general and the exceptional opening of El Escorial, to emphasize how the censorship can be effectively limited through political and practical means.

Teaching Industrial Chemistry at the University of Bologna: Institutions, Places and Protagonists. A century–long Journey, from the *Scuola Superiore di Chimica Industriale* (1922-35), to the *Facoltà di Chimica Industriale* (1936-2012), to the *Dipartimento CHIMIND* (2012 to Today)
- *Paolo Zani*

On 14/1/1922, the "*Scuola Superiore di Chimica Industriale*" of Bologna University began lecturing in the building ex- Monastero de' Celestini (in the centre of the old town). This institution was the first bearing the intitulation "Chimica Industriale" at the University of Bologna, and it is lasting until today : a one-century life, where places, types of institutional form and protagonists turned around.

In the University of Bologna, an academic institution teaching Chemistry was already present in the Faculty of Natural Sciences, but the purpose of this new entity was to add technical and applied competencies to the profile of laureates in chemistry; this was needed in a poorly developed industrial country, as Italy.

The purpose of this communication is to sketch this journey, from the "*Scuola*" of the period 1922-35, in the improper setting of the "Celestini", to the new "*Facoltà di Chimica Industriale*", built in the period 1931-34, on the hill near Porta Saragozza. These were top-quality, state-of-the-art scientific buildings for those times. These spaces characterized the Facolty, known as "the Chemistry on the Hill", from 1935 to almost today: some of the most relevant protagonists of these times will be presented.

In 2012, the "*Faculty*" was transformed into *Dipartimento di Chimica Industriale*, which is still lasting. At the same time, a new setting for scientific Departments was planned by the University of Bologna, the so-called "Polo Navile" , which is now being completed and where the Department will move in the next future.

Scientific Authority in Mineral Analysis: Heinrich Rose (1795-1864) and Hans Rudolph Hermann (1805-1879)

- Sarah Hijmans

In 1844, Heinrich Rose announced his discovery of niobium, a metal which closely resembled tantalum. During the twenty years that followed, the exact amount of metals in the tantalum-niobium family remained a matter of debate. Besides Rose, one of the main contributors to this debate was Hans Rudolph Hermann. This presentation will compare the reception of Rose and Hermann's publications by the European chemical community, and show how a difference in status influenced their scientific authority. Rose was born into a well-known family of apothecaries and had studied under the famous Swedish chemist Jöns Jacob Berzelius. He was professor of analytical chemistry at the University of Berlin and the author of a very popular textbook of analytical chemistry. Hermann, on the other hand, was much less known. Originally from Dresden, he had settled in Moscow where he sold mineral waters while also regularly publishing articles on analytical chemistry. Both men announced the discovery of an additional tantalum metal, but whereas Rose's pelopium was generally accepted to exist until he retracted his own discovery, Hermann's ilmenium was poorly received. Rose was regularly cited as an authority and it was only after his death in the 1860s that his results were revised and some of his methods criticized.
As opposed to the history of the rare earths, that of the tantalum family is still relatively unknown; besides highlighting the role of authority in scientific discourse, this paper therefore aims to shine a light on a relatively unknown corpus of primary sources.

The Chemical Engineer George Standart: A Triple Agent?

- Vera Dvorackova

The American George L. Standart is a prominent yet mysterious figure in the world's post-war chemistry. In Czechoslovakia, as well as in Cuba and later also Great Britain, he founded or substantially developed the discipline of chemical engineering, nurtured up a number of outstanding chemical engineers, wrote some important monographs and university textbooks, and was also involved in the industrial application sphere. His personal life, however, has always been the subject of great speculation, mostly due to the fact that his life story was very unusual. He was born in Detroit, USA, graduated from the California Institute of Technology in Pasadena and joined the Communist Party of the USA in 1944. In 1948 he and his wife travelled as tourists via Paris to Prague, where he applied for political asylum. He worked for the University of Chemistry and Technology in Prague and later also the Czechoslovak Academy of Sciences. There is evidence that the Standarts had joined the ranks of Czechoslovak foreign intelligence informers in 1953, having been handed over from the Soviet intelligence service. In 1967 Standart and his family left for Great Britain, originally to spend a year's internship at the Imperial College in London, but he never returned to Czechoslovakia. Suggestions of his affinity to a western intelligence service, thus making him a double agent, were supported by the fact that his name was found among the contacts of George Gerbner, a Hungarian-born American, who was probably an agent of the US foreign intelligence service.

14:00-16:00 - Sessions

7 - International History of Radical Science Movements

Room: **AY.2.114**

Organiser: Gerardo Ienna

Chair: Sascha Freyberg

Session Abstract:

Recent awareness of the problematic relationship between politics and science, the discussions about truth and trust, social orientation and public participation in science (open and citizen science) has also led to renewed interest in the history of the Radical Science Movements. From the late 1960s onwards, particularly in the wake of the '68 social movements, Marxist and New Left orientations began to take hold more also among science students and scientists. Now movements and organisations emerged which discussed and disseminated scientific knowledge in new ways.

In the last years the most prominent of these cases such as Science for the People in the U.S. and the Radical science movements in the U.K. got some attention. However, not only have other West European cases (such as the Italian, French, German etc.) either been grossly underestimated or not thoroughly investigated, it has not even been discussed what the relation of these movements where beyond the national contexts. What is still missing in this history, is a unified framework as well as a narrative to relate the different contexts and broaden the view to include the Eastern Bloc, Non-Aligned States and the Global South. With this panel we propose to open a discussion forum aimed at promoting 1) the study of unexplored national cases of political movements in science or dedicated to scientific knowledge, 2) comparative studies of national cases in order to work out similarities and differences, and 3) analyse the interconnections (theoretical and material) at a transnational level between these militant groups hitherto described as relatively autonomous from each other. In this way we want to reframe the history of science from below and give science studies as well as 'citizen science' new perspectives in terms of a political epistemological approach and vocabulary. The tensions of truth and trust, public engagement and social orientation of science, activism vs. expertism, institution vs. movements,… etc. can be analysed differently in this way.

The Crucial Significance of Political Influences in the Work of the Italian physicist Franco Selleri

- Luigi Romano

The role of the Italian physicist Franco Selleri (1936-2013) in the fields of Particle Physics, Foundations of Quantum Mechanics (FQM) and Foundations of Relativity Theory (FRT) during the years 1960-2010 has been thoroughly analyzed. His unpublished documents revealed a considerable amount of handwritten notebooks and correspondence with scientists and Nobel laureates around the world. It emerged the deep connection between Selleri's research and the contemporary socio-political environment in which he worked; the pivotal influence his historical, philosophical and political beliefs played on the unorthodox lines of his researches, focused on a criticism of the orthodox view of FQM and FRT. Specific correspondences illustrating Selleri's interactions with other politically aligned scientists are also displayed.

In Particle Physics, his early ideas on Peripheral Model for the single pion production in p-p collisions; the One Pion Exchange Model in the high energy inelastic processes; and the nonconservation of the angular momentum for strange particle in weak interactions, played a wide resonance during the years 1960-

1969, although they were soon overtaken by the Gell-Mann idea of quarks. Concerning FQM, leaded by his idea of Local Realism (based on locality, reality, and time's arrow), Selleri criticized the Copenhagen interpretation of Quantum Mechanics, analyzing the Hidden Variables, the EPR Paradox, Bell's inequalities and Bell-type experiments, the Empty Waves, and so on. In FRT, Selleri introduced the so called Inertial Transformations (which established a symmetry between space and time coordinates), and he tried to create a theory alternative to Special Relativity Theory, namely the Weak Relativity.

Science and Vietnam: The Genesis of a Transnational Radical Science Movement

- *Gerardo Ienna*

The criticism of the use of science and technology for military purposes (especially by the U.S. in the Vietnam War) was one of the transversal themes of the various Radical Science Movements at the national level, especially within the physicist community. On this point have insisted many publications of the time in journals such as Radical Science Journal, Science for the People, Sapere, Survivre et Vivre.

The presence in Europe in 1972 of some scientists of the Jason Commission was the trigger for the emergence of a series of protest activities coordinated between Italy, France, United States. In this context the community of militant physicists has been particularly active, exposing themselves in first person to face the "non-neutral" activity of their colleagues. Here are some examples:

- on June 13 the Nobel Prize for Physics Murray Gell-Mann was expelled from the Collège de France by the Collectif Intersyndical Universitaire d'Orsay "Vietnam-Laos-Cambodge"
- During the summer schools of physics of Erice (Italy) and Cargèse (France) the presence of John Archibald Wheeler, Gell-Mann, Sidney Drell creates tensions
- During the summer school in physics of Varenna (Italy) a collective manifesto entitled "Statement on Vietnam" is drawn up
- Violent protests during the international conference in Trieste entitled Development of the Physicist's Conception of Nature
- Varenna's Statement on Vietnam was distributed during the Conference on High-Energy Physics in Batavia held in September (US)

With this paper my aim is to reconstruct how the theme of the war in Vietnam has favored a synchronization of the activities and claims of local Radical Science Movements.

Radical Science Movement in France

- *Renaud Debailly*

This communication examines the radical science movement in France in the aftermath of May 1968. In its early days, this movement was inspired and influenced by other radical science movements abroad (US, GB, Italy, Belgium). In this perspective, the critique of science and technology led to counter-expertise activities or the questioning of hierarchies and inequalities in the scientific institution.

Ephemerals political journals appeared during this period where scientists, engineers or technicians wrote articles about ecology, feminism and the power of the "Mandarins" in the scientific laboratory for examples. Regarding the counter-expertise, since the 1970s different groups appeared to tackle the issue of nuclear energy or asbestos. During the next decade, science shops were also established on the Dutch science shops model.

However, the radical science movement in France experienced a singular evolution during the 1970s and the 1980s. The considerations about the role of science in society also converged with the renewal of the study of science in academic disciplines (history, philosophy and sociology of science).

In the perspective of a political sociology of science, we suggest that the understanding of the radical science movement in France implies to take into account *i*) the political context of the 1970s (the rise of

Left-wing movements, the importance of the Communist Party and its conception of science), *ii*) the relationships between the movement and the disciplines dedicated to the analysis of science and technology. The interrelations between these two dimensions are crucial to grasp the specificity of the French movement.

Counter Cultures of Knowledge and the Social Orientation of Science: German Cases and Debates 1960-1990

- Sascha Freyberg

In the second half of the 20th century technological progress and the, great acceleration' brought about a growing awareness of the role of science and scientific R&D. In contrast to many West European countries in the FRG this did not lead to the establishment of a strong 'radical science movement'. In the GDR science was supposed to have a social orientation by definition. However, even in this context the 'scientific-technological revolution' began to be investigated and also questioned in its negative aspects, in particular pertaining to ecological problems. Nevertheless, in both cases there existed, what could be called 'counter-cultures of knowledge' in grassroots as well as institutionalized forms. The talk will present some of these cases and discuss reasons for the absence of a German 'science for the people' as well as the work of Science of Science institutions in both Germanies from the 1960s to the 1990s. Leading questions of the inquiry are if and how scientific and civic projects were related to each other and how political and epistemological issues were connected in the respective understandings of science in society. Did different understandings of this role influence science policies and what kind of knowledge economies were at stake?

18 - Epistemology and Politics in Climate Science - 2 (1980-2020)

Room: **UB.2.147**

Organisers: Matthias Heymann & Dania Achermann

Chair: Fabian Link

Session Abstract:

The history of science has convincingly shown that science and politics interrelate in many ways. Science bears political qualities, and political contexts inform scientific development and understanding. Climate science is an obvious case and provides many examples throughout history. This symposium aims to investigate the multiple relations of epistemology and politics in climate science through history and seeks to understand the nuances of these relations and, in particular, their various impacts in the scientific and social spheres. To deepen our understanding of the relations between epistemology and politics in climate science, we wish to discuss questions such as the following:

- Which features of climate science made it attractive to political interests? Is there something special about climate science in comparison to other disciplines?
- How has politics influenced climate science, and what are the relations between epistemology and the politics of climate science?
- How did the unequal political significance/authority of different scientific disciplines and methods influence the development of climate science?
- How did the relations between politics and climate science affect and influence climate research, as well as the understanding of climate in science and society?

- Which social actors drove political interests in and the politicization of climate science; and what role did climate scientists play in shaping relations with politics?
- How did politicization affect autonomy in and control of climate science? Did climate scientists gain or lose power, autonomy and control over their discipline?

Climate Politics as Opposed to What? Deconstructing the World Climate Conference of Experts on Climate and Mankind in Geneva, 1979

- *Vladimir Jankovic*

In his 1982 paper entitled 'Politics as Opposed to What,' Stanley Cavell argued that contemporary trends in literary and critical theory led to what he identifed as a particular 'collapse' of the concepts of 'politics' and 'power' into ordinary practices to which these concepts had previously been applied. The politics of writing *became* writing, the politics of interpretation *was* interpretation, domestic politics *was* domestic life. These trends, Cavell suggested, didn't leave any substantial 'what' for 'politics' to be 'opposed to.'
In this paper I extend Cavell's diagnosis to ask whether the scientific research on anthropogenic climate change during the 1970s has been misdiagnosed as immune to the Cavellian collapse. Through an analysis of the contributions by experts on 'climate and humankind' presented at the first World Climate Conference (WCC 1979), I argue that the early history of the science of climate change cannot be understood outside the contemporary resource policy in which climate featured as an 'elite resource' (Maunder 1986). I thus question the conventional image of climate knowledge as a cognitive 'ground zero' from which to build environmental governance and climate policy. Instead, the climate science of WCC 1979 emerges as a symbolic legitimizing device fundamentally imbricated in the late-capitalist managerialism of natural resources (Mandel 1972).

Climate Scientists Assessing Early International Policies on Climate Change: The Case of Bert Bolin (1980-1992)

- *Carolina Granado-Torres*

This paper aims to analyse the figure of Bert Bolin, a Swedish climatologist who played a major role in shaping relations between climate science and politics. Working between knowledge producers and policy-makers, he helped frame the international climate change debate. First, I briefly discuss his early career as a scientific researcher: he served as scientific director of several institutions, like the International Meteorological Institute (IMI). Then, I focus on his active role in political assessment, bringing the climate change issue into the political agenda of the 1980s. I examine the creation of the first advisory institutions to assess political negotiations, in which Bert Bolin participated. He actively contributed to the creation of the IPCC, which he chaired for nine years. Further, I analyse his contributions in the three major assessment conferences that took place in the late 1980s, when the climate change issue broke onto the international political agenda. I examine the numerous articles he published on the role science should play in policymaking, defending the idea that science must remain neutral and "talk truth to politics". Finally, I discuss his partly autobiographical book *A History of Science and Politics of Climate Change*, in which he defends and legitimizes the role of the Intergovernmental Panel on Climate Change (IPCC) in the assessment process. Through his complex biography, I explore how climatological expertise was institutionalized in international politics and how power and authority are assigned in global governance.

Chilean Climate Scientists' Involvement in Public Policy from a Historical Perspective

- Cecilia Ibarra

In Chile, climatology is an area of research that has grown under the wing of atmospheric sciences and meteorology. From its beginnings, it was positioned as a local phenomenon articulated to a global enterprise, connected to the international organisations that study it and to the multilateral governance of climate change. This presentation explores the involvement of Chilean climatologists in local politics. According to environmental ministry surveys, climate change is a concern for most Chileans, and there is widespread confidence in the diagnoses provided by science. In this scenario, climatologists have been expanding their repertoire of roles in relation to local politics and policy making. The presentation takes a journey between 1980 and 2020 to analyse the emergence of climatology in Chile at the end of the 20th century, the creation of the first specialised climate research centre in 2010, and its growing involvement in public policy. Among the roles of climatologists in climate governance and local politics in the 2000s are their participation as authors of the IPCC Reports, members of foresight panels organised by the government, scientific advisors for the ministries of environment, energy and international relations, members of the scientific committee for COP25, which would initially be held in Chile, and advisors to parliament and the ministry of the environment in the discussion of the country's first Climate Change Act. The analysis will focus on the effects of political involvement in research agendas, the relationship with society and the independence of climatologists.

When Both Sides Speak in the Name of "Science": What Can We Learn about Representations of Science and Epistemological Norms from Climate Change Scepticism?

- Richard Staley

Both climate scientists advocating the possibility – the urgency – of anthropogenic climate change and sceptics railing first against the fact of global warming and then against what they call climate alarmism claim that they speak for science. Similarly, at different times members of the research community have attacked scientists as diametrically opposed in their stances to climate change as James Hansen (in 1989) and Fred S. Singer (in the 2000s) for their claims to represent science, often charging them with the politicisation of science. This paper examines several significant examples of debates across both stances that have occurred over the last 35 years in order to identify the assumptions underlying representations of science and epistemological norms in such times of contest. Although they have certainly attacked particular findings, this study will highlight the perhaps surprising fact that climate change sceptics have usually *defended* science and argued against its politicisation. It is in their accounts of specific institutions and behaviour that the Nongovernmental International Panel on Climate Change and the IPCC differ most, not in the norms they profess – and this is something we will need to recognise in accounting for trust in science across political and economic fault lines.

20 - Science, Technology and Education in Socialist Yugoslavia, 1945 – 1990

Room: **UA.4.218**

Organisers: Maja Korolija & Milica Sekulović

Chair: Kenneth Bertrams

Session Abstract:

Yugoslavia left the Eastern Bloc on June 28th, 1948 to develop an autonomous political position in South-Eastern Europe. The new Yugoslavian system of socialist self-management combined elements of workers' self-government, controlled market relations, state decentralization and Party control. Most of these elements revised or opposed the ideology of Marxism-Leninism. The Yugoslav system represented a heterodox form of socialism. This heterodoxy was also reflected in the formation of specific traits in the fields of science, education, and technology.

Our symposium analyses some aspects of Yugoslavian science, education and technology as part of socialist self-management, in the context of economic, political, and international processes that shaped the Yugoslavian Cold War experience. Our objective is to explore ideas and decisions responsible for the creation of a unique realm of technoscientific and pedagogical practices that have a continuing relevance for current discussions on science and politics, globalization and decolonization. We ask:

- How do different ideological and economic dynamics impact the role of science, education and technology in society?
- How did the break-up with the USSR influence Yugoslavian educational system?
- Which socio-economic forces and actors put up a resistance to science, education and technological development?
- Is autonomous science possible? Is partisanship in science possible?

How are international processes reflected in science/education/technology policy organization?

Throughout its existence, socialist Yugoslavia represented a treasure trove rich in authentic dynamics between science and society. Research into this intertwining opens up an opportunity to talk about Non-Alignment and to illustrate a "third way" that has usually been ignored in the emphasis on bipolar tensions during the Cold War. The symposium thus offers a window into a relatively neglected, yet fascinating, hybrid of self-managed socialism, non-alignment and political sovereignty that were not unknown to most world nations during the post-war period.

State and Science: Yugoslav Nuclear Program (1948-1965)

- Maja Korolija

The aim of this presentation is to briefly describe the development of the Yugoslav nuclear program in the socialist self-management society during the Cold War. Main focus will be placed on the dynamics of the relationship between state and science in Yugoslavia after the 1948 break with the USSR, which was until then perceived as an ideological leader to Yugoslavs. After this fall out, the USA saw Tito, Yugoslav president and Communist Party leader, as an ally and first dissident from the USSR, and thus decided to help Yugoslavia with food and arms. These international changes during the initial stages of the Cold War have reflected on Yugoslav ideology, its economy and state organization, and also contributed to the state's different perceptions of the role of science.

The author of this presentation will try to discuss the dynamics of relations between state and scientists

(physicists), as well as the importance of these relations for the Yugoslav nuclear program and the development of nuclear physics in Yugoslavia in general. Using a comparative method in order to fully and accurately analyze the relationship between the Yugoslav state and science, the author will contextualize it by exploring the relationship between science and the state in cases of the USA and USSR in this period.

Circulation of PC Technologies in Yugoslavia before Its Break

- *Jelena Stanulović*

During the 80's, even though self-management was still highly praised, Yugoslavia was facing socio-cultural paradigm change towards entrepreneurial culture due to economic crisis. Western influence on the cultural elite, and youth Intelligentsia in Yugoslavia played an important role, especially in the domain of makers culture and personal computers development. All over Yugoslavia, in the late 80's personal computers were self- built, for both its hardware and software components, and the network among enthusiast was established and technology knowledge was freely shared. One PC magazine started the movement publishing in details how to construct and make it yourself your very own PC named after the magazine itself: ''Galaksija''.

This paper will approach the circulation of ''home-made'' PCs using the media (magazines, TV, radio). Those media produced other social influences and student participation in makers culture, thus the paper will propose studying ''amateur culture'' (Jaroslav Svelch) and student participation in socialist Yugoslavia in technology transfer. Secondly, the paper will also address the influence of economic restraints and economic crisis in socialist Yugoslavia in the '80s on entrepreneurial computer business-related culture, and the role of maker culture in the grey/black market economy.

Yugoslavia's Medical Cooperation with Developing Countries during the Cold War

- *Vedran Duančić*

Various East European socialist countries maintained strong ties with the developing countries across the world, yet in few places was "socialist internationalism" ascribed such an importance as in Yugoslavia, where it was made into one of the pillars of the entire political system. Together with construction and civil engineering, medicine came to play an outsized role in promoting Yugoslavia's interests abroad—and brining in much needed foreign currency. Between the early 1960s and the dissolution of the country in the early 1990s, thousands of physicians from developing countries were educated at Yugoslavia's universities and thousands of Yugoslav medical experts practiced and taught medicine in the Middle East and Africa. Yet there was no obvious reason for medicine to become the most prominent form of Yugoslavia's international cooperation. How to explain its prominence then? The paper, first, addresses the role of public health in the contemporary developmental theories and policies (including in Yugoslavia's idiosyncratic self-managerial socialist system); second, approaches medical cooperation in light of science diplomacy; and, third, proposes to study the circulation, transformation, and appropriation of scientific knowledge arising from this cooperation in light of the shift from reception studies, which tended to reinforce centre-periphery hierarchies, to studies of appropriation of knowledge and technology, which ascribed more agency to the "receiver," and still further, to the reimagining of scientific production as plurilocal and scientific-technological exchange as globally entangled, taking into consideration actions of a multitude of actors on various levels.

Comment: Vladimir Janković

25 – Science, Religion and Atheism – 2
Room: **AW.1.125**

Organisers: Kostas Tampakis & Jaume Navarro

Chair: Kostas Tampakis

Session Abstract:
Recent scholarship has explored the context and agendas of John W. Draper, Andrew D. White and their promoters showing that the so-called conflict thesis was not so much a pro-atheistic movement, not even an anti-religious campaign, but an attempt to reform Christianity from within, or a broad notion of religion in Western, mostly Anglo-American settings. While the field of science-and-religion has, in the last few decades, benefitted from a new array of approaches, broadening the geographical scope of such studies for instance, the organizers of this panel feel that there remains to be done a serious exploration of the history of explicit atheism as part of the historiography of science-and-religion.
The spread of "scientific materialism" or explicit "scientific atheism" were part and parcel of the development of Marxist ideologies, for instance. But there were other forms of materialism and atheism that took "science" as their ideological alibi. By so doing, they not only shaped a very specific notion of "science" but also transformed, at times, atheism as a new form of religion. Recent examples such as so-called "New Atheism" may be seen as only the re-edition of an old project of proving the non-existence of God from the activities, theories or institutions of science.
This panel explores the ways science and atheism have related to each other in the last two centuries, with a particular interest on how these two notions have shaped each other as seen by scientists, historians, philosophers, politicians, popularizers and religious authorities.

Science as a Weapon against Atheism and Communism: The Christian Union of Scientists and the Journal Rays in Greece (1940-1970)
- Kostas Tampakis
When Richard Dawkins was a small child and Christopher Hitchens yet unborn, in 1946, to be an atheist had a very different meaning in Greece than it is commonly assumed today. In Greece, the Communist Party had a strong presence. As a result, the end of the Second World War found Greece in the midst of a bloody Civil War between Communists and Western Allies. Atheism was associated with communist beliefs, by both sides of the ideological fence. The journal "Rays" was founded in 1938, with the express aim of "providing moral and ethical guidance to the modern man". Being published by the Christian Union of Scientists, the journal "Rays" was in reality one of the many ventures of the para-ecclesiastical religious brotherhood "Ζωή" ("Life"), with the ultimate goal of battling materialism, communism and all other modern ideas that were deemed harmful for the national project. Both the journal and its attending organizations played a prominent role in the intellectual and ideological battle that accompanied the Greek Civil War of 1946-1949, and continued to be very influential until the Junta of 1967. The article will explore, for the first time, the narratives, themes and participants in the journal «Rays», and describe the way science and Christian Orthodoxy were used as ammunition in the political and social battles of the era.

Personality Cults as a Form of New Religion in Post-Soviet Countries
- Katarzyna Jarosz
My research is focused on the mechanisms, strategies and techniques of creating, keeping and forgetting

cults of personality in the post-Soviet countries, as one of the key elements of shaping or re-establishing national identity, as seen through the lens of historical, archaeological, scientific and ethnographic museums. Cults of personality have several characteristics typical of a religious cult, and can reach the dimension of a religion. They are authorised as they work to establish their cultural identities, particularly after long periods of colonisation. One of the things that can be done in new countries with no history is to deify the leader. The personages thus deified may be current or former leaders, historical or mythical heroes.

In this paper I shall explore the interface between nation, science, atheism and personality cults in post-Soviet museums. The history told in museums often incorporates selected episodes into a national narrative. Nation builders and policy makers, along with academics have used different disciplines; anthropology, history, ethnography, toponomastics, literary studies, biology and genetics, to revise history to match the official ideology, of selective narrative, fitting better to official ideology.

The research shows that the museums may play an instrumental role in forging cults of personality. Particularly:

- Personality cults support the idea of ethnic nationalism, which focuses mainly on a national identity shaped by the concepts of common ancestry or common race.
- The rediscovery of national heroes has deep symbolic meaning for the contemporary power. The deified person is a symbolic reflection of a historical or mythical hero.
- Underlining the ethnic lineage of the country, with the leader being the essence and the embodiment of a nation, is a key element of the process of building a cult of personality.
- Scientific disciplines and scientific milieu have significant influence on the above-listed process.

Enemy at the Gates? The Perception of Atheism and Its Relationship with Science by Greek Orthodox Christian Authors (1936 to 1974)

- *Sandy Sakorrafou*

Over the last twenty years, the study of the history of science and religion in Greece is gradually advancing. Some accounts illustrate Orthodoxy's stances toward specific scientific theories, especially Darwinism, or classify the representative agents of these attitudes. Other accounts investigate the perception of science in general and its relationship to Orthodox Christianity by the involved actors, who were interested in theological and scientific issues. Project At.H.O.S introduces for the very first time the notion of atheism in the study of the science-religion relationship in Greece. Specifically, the project explores how both religious unbelief (here political-laden atheism) and belief (the Orthodox Christian doctrine) have interacted with the Natural Sciences, from the early 1930s to 1974. The project mainly intends to show what other accounts ignore: that atheism played a concrete – not insubstantial – role in the shaping of the depiction of the science and religion relationship. In this perspective, the paper will explore the very idea of atheism and how it was perceived by Greek Orthodox Christian authors during the said period. How did they define atheism? What were the types of atheism they referred to? How did they describe the categories of religion and science? And in what way and degree did they connect science with atheism? It should be stressed that the question of the role of atheism in the science-religion relationship will not be directly examined through a case study of atheism, but rather against the religious convictions of those who define themselves as Orthodox Christian believers and usually accuse the non-believers of being the enemies of religion.

Discussion

31 - Astronomers' Histories of Astronomy: Practices around the Paris Observatory (18th-19th Centuries) - 3

Room: **AY.2.108**

Organisers: Giorgio Matteoli, Matthieu Husson, Christophe Schmit

Chair: Matthieu Husson

Session Abstract:

Astronomers of different periods and cultures ordinarily relied on astronomical works made in some cases several centuries before, in contexts very different from that of their own practices. Accordingly, they may discuss the theoretical, instrumental or observational basis on which these works were initially built or the documents and intermediaries through which they were transmitted to them. In particular situations, these discussions may develop into consistent attempts at writing different kinds of history of astronomy.

Analyzing the changes in the historiographical discourses thus produced by astronomers is a promising venue of research which may for instance allow us to track changes in the practices of astronomers as well as the relations of these changes to broader institutional and political dimensions. The symposium seeks to explore this general issue focusing on the historiographical practices of 18th and 19th centuries astronomers connected to the Observatoire de Paris. From Cassini to Delambre, including Delisle, Le Monnier, Lalande and many others, astronomers connected to key political scientific institutions in France Observatoire de Paris, as well as the Académie royale des sciences de Paris, produced differents historiographical discourses on astronomy. These discourses reflect the perspectives of these key political scientific institutions as well as some of the deep transformation astronomy practiced in Europe underwent in this long 18th century with echoes linked to the enlightenments on a global scale.

Thus the presentations of this symposium will address issues including:

- the types of sources, their uses by the astronomers and how they access and collect them;
- the topics and questions their historiographical discourses address, and the kind of historical actors they consider;
- the conceptions of the discourses, of historical causality or temporality, and if so what issues they are connected to issues broader than the history of astronomy strictly.

Delambre as a Historian of Astronomy through the Lenses of Paris Observatory Archives

- Matthieu Husson

Delambre contributions to the history of astronomy are certainly long lasting in many respects. They left different remains in the archives of the Paris Observatory. These archives reflect different facets of Delambre work in the history of astronomy. Most are directly related to the writing of his different *Histoire de l'astronomie* (e.g. different corrected and commented proofs). Others seem to be connected to some of Delambre's teaching activities or to the Académie des Sciences (e.g. notes on Hipparcos). Finally, few of them are associated with Delambre works in the edition of ancient Greek astronomical texts like linked notably to Ptolemy (e.g. Notes on Theon of Alexandria). I will briefly describe this archive, its constitution and through a few examples illustrate these different facets of Delambre activities as an historian of astronomy (e.g. an interesting notes on Regiomontanus astrological computations).

How J. -B. Delambre Read and Reconstructed the Ancient Greek Arithmetic

- Xiaofei Wang

At the turn of the 19th century, in the effort of the mathematician J. L. Lagrange and the astronomer J. -B. Delambre, there emerged a revival of the interest in the ancient Greeks' mathematics. This paper studies Delambre's memoire on the ancient Greek arithmetic, which was inserted in the French translation of Archimedes' works by François Peyrard in 1807. I will show in which context this work was carried out by Delambre, and what sources he could have used for this presentation of ancient Greek arithmetic. My aim is to reveal Delambre's methodology to approach this historical subject. Motivated to show the spirit of the ancient Greeks' arithmetical operations, Delambre adopted, instead of the direct use of Arabic numerals, the concept of "complex numbers" especially used before the reform of the metric system. He thus made an analogy between the arithmetic of the ancient Greeks and the arithmetic of "complex numbers". Through analyzing how Delambre read and reconstructed ancient Greek arithmetic, the paper clarifies Delambre's intention to fill the gap between ancient Greek arithmetic and modern arithmetic. Moreover, Delambre's work on ancient Greek arithmetic was connected to his publication of the history of astronomy in 1817, where he implied ancient Greek science as superior.

Joseph Delambre's Historiography of 'Oriental Astronomy'

- Karine Chemla

In 1817, Jean-Baptiste Joseph Delambre (1749-1822) published the two volumes of his Histoire de l'astronomie ancienne. In this Histoire de l'astronomie ancienne, Delambre was bringing together his competence as a scientist and his knowledge of ancient languages. He was relying on recent editions of ancient mathematical and astronomical works such as the edition and French translation of Ptolemy's Almagest published by N. Halma between 1813 and 1816, which had been carried out following new editorial principles and to which Delambre had contributed voluminous notes. Delambre could also benefit from numerous publications about the astral sciences in Sanskrit and in Chinese that had appeared in the previous decades. This talk first aims at analyzing an interesting feature of Delambre's historiography of astronomy, that is, that he does not oppose the history of mathematics and that of astronomy, but weaves them together. After examining the effect of this practice on his historiography, I will turn to the second part of the Histoire de l'astronomie ancienne, which is titled "Astronomie Orientale". Indeed, Delambre's Histoire de l'astronomie ancienne is a global history, to use a modern

expression. The questions addressed will be: What was his goal in producing a history of this kind, and which kind of global historiography emerges from the book? What are the sources used in the "Astronomie Orientale" section? How does Delambre exercise his critical approach to his sources? How does he treat the history of astronomy in relation to mathematics, and how does this inform his global historical picture?

Discussion

40 - The Politics of Data, Environments, and Infrastructures - 3

Room: **AW.1.121**

Organisers: Matthew Adamson & Doubravka Olšáková

Chair: Gordon Barrett

Session Abstract:

One of the most prominent topics in science diplomacy is knowledge infrastructures: their creation, their upkeep, and their implications for international relations, resource conservation, and environmental stability. Historians have discovered increasing evidence across time periods and scientific disciplines that geopolitics profoundly informs data collection and sharing (Aranova, 2017) as well as establishes the conditions and possibilities of the study of world systems (Edwards, 2017). This panel, sponsored by the DHST Commission on Science, Technology, and Diplomacy (STAND), extends this line of inquiry by considering milestones of historical knowledge infrastructures, international environmental and natural resources surveying, cartographical establishments, and astronomy and space science. The insights of these historical researches are of inestimable significance in our current period of big data, climate change, and biosphere degradation. This panel provides the sorts of diverse perspectives on these global infrastructures necessary for furthering historical research and indicating the relevance of that research to as wide an audience as possible. It shows that data is never "raw", but a result of diplomatic as well as scientific initiative, and therefore a matter of considerable importance to those studying science diplomacy.

International Seismic Data Centres in the Twentieth Century

- Lif Jacobsen

The instrumentalisation of seismology in the late nineteen century led to an awareness that new knowledge necessitated international cooperation and data sharing. To that end, the International Seismological Association (ISA) was established in 1901. The ISA provided an international framework for distribution of seismic data, a data repository and a program for discipline development. However, national rivalry, enforced by the scientists themselves, hampered the two first decades of the ISAs work. Subsequently, during the course of the twentieth century, multiple international or semi-international data centres were established (and closed), typically organised along geopolitical fault lines. A praxis that continues today with international monitoring of earthquakes and nuclear-bomb tests that depend on national stations providing real-time seismic data.

In this paper the ISA acts as a starting point for mapping the efforts of creating international data repositories and data sharing facilities paying special attention to the diplomacy surrounding such efforts, thereby exploring different modes of science diplomacy.

Science Diplomacy and the Italian Communist Party During the Cold War

- Daniele Cozzoli

In the analysis of science diplomacy during the Cold War emphasis has been placed in the agency of individuals (scientists and scientific policymakers) and/or international and transnational scientific institutions. The role of political parties has been, on the contrary, poorly investigated in spite of their pivotal role in the history of the twentieth century. In twenty-century Europe the entrance of large masses of people in the political arena transformed political parties from groups of few personalities in large organizations with hundreds of thousands or even millions of adherents. The political organizations of the worker movements often led their opponents to create symmetrical mass organizations. This paper aims to contribute to the investigation of the role of political parties in Cold War Europe science diplomacy by focusing on the case of the PCI (the Italian Communist Party). The PCI was the largest Communist party in Europe. Throughout the Cold War it became a forum in which intellectuals, scientists, professional politicians, technicians and workers debated freely together. Decisions in the party were taken after long discussions involving thousands of adherents. In a party meeting social distinctions were overcome: a worker, a student and a famous scientist could talk freely. This paper firstly argues that in the 1970s science and technology acquired a pivotal position in the party's reflection, with the focus on the environmental question, the criticism to the industrial-military complex and the reflection on the social function. Secondly it explores how between the second half of the 1950s and the early 1970s the party became an intellectual laboratory, which not only influenced the science diplomacy of individuals in trans-national and international organizations, but which developed a proper science diplomacy towards the Soviet Union and the socialist world. The paper also discusses to what extent a party science diplomacy differed from that of individuals.

The Hidden Corners of the Uranium Information Clearinghouse: The Politics of the *International Uranium Geology Information System*

- Matthew Adamson

The initial iteration of the International Uranium Geology Information System (INTURGEO) was completed in 1988 under the auspices of the International Atomic Energy Agency (IAEA). It represented the first attempt at an international database of uranium deposits. As a product of science diplomacy, the data of INTURGEO was, at first glance, without political reference. This paper is a preliminary exploration of INTURGEO's first iteration in order to discover the geopolitical implications behind the collection, curation, presentation, and circulation of world data classifying and describing the geology of uranium deposits and occurrences. After all, beneath the surface, politics was everywhere: in the process of persuading countries to provide data, in the visual and textual representation of that data, in the availability or lack thereof of the database to various IAEA member states. Most of all, INTURGEO was an attempt to build the IAEA's bureaucratic autonomy in the area of nuclear raw materials, thereby introducing a novel force of standardization of uranium exploration and exploitation in the world.

Comment: Sam Robinson

50 - Hospitals, Diseases and Public Health Policies: Local vs. Global Determinants of Healthcare in Contemporary History

Room: **AW.1.120**

Organisers: Isabel Amaral & Monique Palma

Chair: Céline Paillette

Session Abstract:

Diseases, pathological agents, spaces, and public health policies are on the contemporary medical, political, environmental, and social agenda, particularly in the context of the current pandemic debate. Throughout history, institutions of education, research, and clinical practice, such as hospitals, have constituted themselves as agents of construction and social response to scientific policies defined in different social and political contexts. At the same time, it is important to reflect on the space, memory, and heritage that these institutions represent in the ideology of medicine, health, and diseases, namely on their impact on the design of health heritage conservation policies for current and future generations. The set of themes gathered in this symposium focused on moments of "medical stress" (epidemics/pandemics, new diseases, or new spaces for care and healing) will allow for a more comprehensive approach to two complementary aspects, for which scientific policies were decisive, both in Portugal and in Brazil, both in rural and urban regions: i) the evolution of scientific and expert knowledge using the lens of the history of medicine, urban and social history; ii) encouraging the discussion of the relationship between medicine and heritage, between the memory of diseases and the spaces that confined them.

In short, it is intended to reflect on the local and global determinants of health in contemporary history, focusing on the "scientification" of the medical approach, based on some case studies: in Portugal, Lisbon, Porto, and the North Region; in Brazil, in the State of Rio de Janeiro.

Hospitals in Northern Portugal in Times of Epidemic (19th Century and First Decades of the 20th Century)

- *Alexandra Esteves*

Our intervention aims to analyze and reflect on the difficulties faced by hospitals in the north of Portugal in the face of epidemic outbreaks. The aim is, therefore, to show the weaknesses, namely with regard to facilities and material and human resources, both in large hospitals, such as Hospital de Santo António (Porto), and in smaller establishments.

Between the mid-19th century and the first decades of the 20th century, Portugal was affected, albeit in different ways, depending on the region, by several epidemics. The population of the north of the country, in particular, suffered the effects of epidemics of cholera, typhoid fever, typhus and bubonic plague, although this was only felt in the city of Porto.

Our study is based on hospital sources, especially hospital admission records, reports and minute books, as well as the press and medical publications, namely dissertations and articles on hospitals and epidemics.

Hospitals: Healing, Heritage and Healthcare Policies for Society - The Case of Porto (20th Century)

- Monique Palma

This paper is part of a research which involves mapping 20th-century medical places in Porto in order to uncover the urban history of medicine and bring a contribution to the history of healthcare policies in Portugal to a large audience, using Porto as a case study.

This analysis is consistent with the 2030 SDGs within the scope of policy guidance for heritage and development players. As a result, it is critical to begin this research in order to place the preservation of Portuguese culture's history, memory, and heritage on the political agenda, particularly medical culture, which is one of the most important drivers of civilizational development. Hospitals are institutions of scientific knowledge and we would like for society to have this perception. In this presentation, our aim is to emphasize historical urban medical care policies that our research aimed at mapping medical places allowed us to find. We will conduct archive research (manuals, treatises, reports, periodic journals, newspapers, etc.) and interviews with key players from medical institutions and medical museums.

The findings of this study will be used to promote the preservation of the most iconic healthcare and medical places built or destroyed under political guidance and science policy.

Between the Old and the New Manguinhos Hospital, from Tropical Diseases to COVID-19 Epidemics: Some Reflections on Scientific Politics and Heritage

- Renato Gama Rosa Costa, Renata Santos & Giovanna Martire

In 2020 the Oswaldo Cruz Foundation (Fiocruz), a Brazilian public health institution, established in 1900, saw itself against one of its most challenging tasks, although its traditional performances in the field. One of its strategies to face the disease, besides the production of vaccines, was to build a new hospital – in a very brief time, for the treatment of the victims of COVID-19. It was not the first time that Fiocruz raised, in it headquarter, in Manguinhos, Rio de Janeiro City, a space for a hospital oriented for research and clinical care. The first hospital, named in honor to its patron, the scientist Oswaldo Cruz, was opened in 1918 for the study and treat of tropical diseases. The hospital architecture and its installations – a pavilion structure that showed limitations and obsolescence nowadays, revealed itself even more inadequate for the most recent demand of pandemics emergence. The institution saw an opportunity to build a new installation, more prepared and up to date to treat new patients and a new epidemic disease.

Two years after, the Covid-19 prevalence, and the gradual decrease of hospitalizations, some questions raised: what to do with the old and the new hospital? Which hospital will resist in time? The old, with its heritage appeal, or the new one, with its contemporary appeal, that soon may be transformed or even demolished? Do the diseases demand new strategies of care and architectural structures? What kind of scientific policies are pursued between a past hospital and a new one?

Hospitals and Medical Specialties at the Health's Hill of Lisbon during the 20th Century: Dialogues between Hospitals, Diseases, Medical Knowledge, and Scientific Policy

- Isabel Amaral

By the mid-19th century, several hospitals existed in the Santana Hill area in Lisbon. Most of them, reused convents, and churches. In the early 20th century, there is an increase in the development and teaching of medical specialties settled in these buildings and left undeniable marks in the organization of spaces, production of documents, creation of libraries, and the acquisition and production of highly specialized material culture.

The medical specializations located in the Santana Hill hospitals were, among others, urology, venereology, gynecology, dermatology, radiology, orthopedics, neurology, pediatrics, and pathological

anatomy. Some of these medical specializations had a very significant impact on society mediated by scientific policies. It was the example of dermatology, a specialty born between the hospital and the medical school, which was transformed as a mandatory place to take care of prostitutes from around the country with a significant impact on the development of this scientific discipline and the hygiene program of the Portuguese State.
This paper aims at studying the relations between people, buildings, environments, and non- human actors to understand how medical expertise existing in these hospitals impacted the Portuguese population, and discuss in parallel, how these objects are protagonists of new medical concepts and new scientific policies in Portugal at nineties.

Comment: Céline Paillette

56 - The Perils and Promises of Prediction in Science and Science Policy - 2

Room: **AW.1.126**

Organiser: Theodore Arabatzis

Chair: Theodore Arabatzis

Session Abstract:
In the realm of public policy, decisions rely heavily on the ability to predict future events. Since scientific knowledge is the primary tool for making predictions, scientists often take upon themselves the role of advisor to politicians, policy makers, and the wider public as well. Prediction, however, is not a concept with a fixed meaning. Rather, it has a historical character and has evolved over time. Moreover, the meaning of 'prediction' varies across different scientific fields. Although the role of prediction in the sciences has been a subject of considerable historiographical and philosophical debate, the historicity of prediction has not been systematically addressed. Furthermore, few studies have delved into the ways scientists derive and use predictions or into the particularities of predictions in different scientific fields and their role in policy making.
The aim of this symposium is to address these neglected issues historically. It is part of a project on the perils of prediction in the physical sciences (http://perilsofprediction.gr/), whose aim is to investigate the many faces of prediction in scientific practice and public policy, to explore its significance in different fields, and to historicize its character and epistemic value.
The questions addressed by the contributors include the following:

- How is prediction defined/understood in different scientific fields and in different historical periods?
- What counts as an adequate/successful prediction in different sciences? How are criteria set for evaluating the quality of a prediction?
- How does prediction bear upon policy making? What happens when different scientific communities make competing claims of exclusive expertise on the prediction of a phenomenon?

These questions will be addressed through historical case-studies of prediction in meteorology, volcanology, ecology, and seismology.

The Role of Theoretical Predictions in Designing a Big Science Infrastructure: The Case of the Large Hadron Collider

- Grigoris Panoutsopoulos

The LHC went down in history for its legendary discovery of the Higgs boson in 2012. Said discovery popularized the view that this enormous scientific machine was constructed for the purpose of testing the theoretical prediction of the Higgs particle. Was that truly the case, however? In this paper, by utilizing the technical surveys and the minutes of the meetings of the various councils and committees behind the implementation of the LHC project during the 1980s and 1990s, I will attempt to show that the initial design period of the collider delineated an independent trajectory, unbound by theoretical predictions. This was due to the fact that Big Science machines, such as the LHC, owing to both their cost as well as their scientific, technological and political complexities, demand long-term planning that can span up to 30 years. Across such a timescale there is a very high probability that, until a machine becomes operational, the majority of any pre-existing theoretical predictions will have been discarded, disproved or established. This is the reason why the LHC was not conceived as a machine for the validation of a particular theory, or for the discovery of a predicted particle, but as a multipurpose exploratory machine, a "logical" next step in the chain of HEP accelerators and colliders that had been aiming for increasingly higher energy frontiers. This case study will allow us to contemplate the role that predictions actually play in the construction of the HEP infrastructures and also in the formulation and execution of the science policy of organizations such as CERN.

Technological Predictions in Optics and Astrophysics

- Gauvain Leconte-Chevillard

Historians and philosophers of science have vividly debated the importance of some paradigmatic cases of successful novel predictions. For instance, the prediction of a bright spot at the center of a circular shadow, derived from Fresnel's wave optics in 1818, has raised several questions: did this prediction have more weight in the acceptance of Fresnel's theory than other evidence already known at the time? How was this successful prediction deduced from hypotheses now seen as false or highly idealized? Should we take this predictive success as a proxy of the truth of Fresnel's theory? In this talk, I claim that we can answer these questions if we endorse Popper's notion of "technological predictions", *i.e.*, "constructive [predictions], intimating the steps open to us if we want to achieve certain results".

First, using Woodward's concept of intervention, I define technological predictions as schematic experimental protocols. Second, I argue that this notion sheds new light on the case of the bright spot: it highlights the role played by the physicist Arago, who translated the bright spot prediction into an experimental protocol and tested it. His work showed the experimental fruitfulness of Fresnel's theory, which heavily contributed to its acceptance by contemporary French scientists. This new narrative also explains how this theory exhibited new causal links between theoretical properties and, therefore, why the bright spot prediction represents such a paradigmatic case for scientific realists. Finally, I argue that, contrary to Popper's claim, one can also find cases of technological predictions in the recent history of astrophysics and cosmology, showing that those sciences have acquired an experimental character.

"A Minor Chemical Revolution": Models, Predictions and Quantum Chemical Computations as a Primary Exploratory Tool in Chemistry

- Stylianos Kampouridis

The emergence of quantum chemical computations is usually attributed to the growing speed and

availability of electronic computers. However, this view distorts a complex historical trajectory that lasted many decades and entailed unprecedented transformations in the discipline of chemistry. If the introduction of physical-spectroscopical methods in chemistry in the post-World War II period can be described as a revolution, the spread of quantum chemical computations can also be so regarded. The cornerstone of chemical practice, experiment, was not only challenged as the sole source of genuine knowledge in chemistry but has been superseded by theoretical computations in a growing number of cases.

The history of computational quantum chemistry can be divided into two periods. The first signalled the emergence of "ab-initio methods" and started in the 1950s with a predictive turn that raised ontological questions for the emerging field, and concluded in the 1980s with the acceptance of these methods by the broader chemical community. The second started in the early 1990s when density functional theory (DFT), a drastic simplification of computational problems in electronic structure, proved to be feasible. In less than a decade, DFT dominated the field and changed the dynamics between experiment and theoretical predictions. Computational chemists faced criticism from traditional chemists, while they engaged in internal controversies around the identity of their field. I will argue that the central issue of contention was the place of computational quantum chemistry on the map of chemical practices: Was it meant to replace experiment or to complement it?

Foresight in Science Policy: Science, Prediction, and Neoliberalism in British Government

- *Jacob Ward*

This paper explores the emergence of foresight in science policy in British government in the 1990s, contextualising this against the longer history of futurology and the rise of neoliberal modes of governance. The established narrative of futurology in this period is that its commercialization enabled governments to outsource prediction (Andersson 2014). This mirrors histories that depict managerial and policy outsourcing as a key neoliberal practice (Boltanski and Chiapello 2014; Jackson 2012). This perspective, however, frames the relationship between neoliberalism, prediction, and government purely in negative terms, taking functions away from the state. Neoliberalism, however, is best viewed as a process of state transformation that facilitates market creation and global capital flows. This involves shrinking the state in some ways, such as privatisation, but also expanding the state in other ways.

In the case of Britain, this involved the creation in 1994 of a new centralised futures office, the Foresight Unit, attached to the Government Office for Science. Foresight had origins in Sussex University's Science Policy Research Unit and the nascent field of STS. Foresight went on to become highly influential within British and other European governments as a way to build new forms of public-private collaboration for the future of science and science policy. This paper revisits the history of foresight and the Foresight Unit to explore how and why government re-centralised prediction in science policy in the 1990s and how this can help us better understand the mutually constitutive relationships between prediction, science policy, and neoliberal governance.

125 - Distrust of/in Science

Room: **AY.2.107**

Chair: Baudouin Van den Abeele

COVID-19, Science and the Global South in Historical Perspective: Bolsonaro and Brazil

- *Marcos Cueto*

This paper will discuss some issues examined by historians of the Global South during recent epidemic outbreaks such as the challenges of studying contemporary events, the intensification and trivialization of social inequalities, official insufficient responses that rely on quick technological fixes, the cooptation of scientists to the priorities of politicians and patterns in popular responses to sanitary tragedies. The presentation will center on Brazil that was during the second half of 2020 and most of 2021 the epicenter of the pandemic and had a President, Jair Bolsonaro, that rejected mainstream medical advice and coopted some local medical doctors to insist on a dilemma between public health and economic activities. I will discuss how science appears in the support of Bolsonaro and in the accusations ("irrational" and "genocidal") against him. I will also pay attention to the relationship of scientific discourses to Bolsonaro's glorification of chloroquine, his changing opinion on vaccines and his permanent opposition to lockdowns. I will argue that Bolsonaro illustrate a distinctive historical entanglement of science and politics in a country of the Global South. It resulted from years of neoliberal policies that minimized local medical research, its public-health system and national drug production. It also exemplified a typical Latin American pattern of official temporary responses to epidemic outbreaks that overemphasized technology and ignored social inequalities. Finally, I will discuss what new themes and novel insights have appeared with COVID-19 in the historical study of epidemics in the Global South.

Scientific Controversies and Conspiracy Hunting in the Covid-19 Pandemic: The Case of Hydroxychloroquine

- *Eve Seguin*

Scholars have long shown that "policy science" obeys a different pattern from that of "research science". In the extreme emergency situation of Covid-19, the characteristics of policy science were exacerbated to a point rarely seen in history. As a result, the construction of scientific consensus has drawn upon novel mechanisms.

One is the peculiar treatment of the scientific controversies bearing on various aspects of the pandemic. Although controversies are a generic feature of scientific knowledge production, those on the origin of SARS-CoV-2, accuracy of official mortality rates, or efficacy of face masks, were delegitimized by means of conspiracy hunting. That is, a number of claims made by certified researchers were labelled as "conspiracy theories", a charge that until then had been raised mostly against the oddball pronouncements of obscure groups.

The second novel mechanism is the involvement of an array of actors in this delegitimation attempt. Scientific institutions and elites benefited from the active involvement of lay actors in the public sphere, including the social media. Citizens, journalists, would-be scientists, politicians, and even historians and sociologists of science and biomedicine all contributed to discredit claims that did not conform to the discourse of scientific and political authorities.

In order to illustrate and interrogate this remarkable regulation of Covid-related knowledge, the paper is devoted to the controversy generated by Hydroxychloroquine, a drug that was depicted as an effective anti-Covid treatment at the outset of the pandemic.

Tales from the "Transition": The Fabrication of Friends and Foes in the History of Spanish 20th Century Sciences

- Javier Sierra de la Torre

From the mid-1970s onwards (during the `Transition´ to democracy), a number of historians of science have focused their attention on what has come to be known as the 'Silver Age´ of Spanish science; i.e., the supposed success of the physiologist Santiago Ramón y Cajal's dream of promoting and consolidating the experimental sciences in early 20th Century Spain, a *feat* packed with scientists presented as heroical figures. More often than not, this historical narrative fabricates friends and foes of the experimental sciences, as epitomized in the title of the 2010 book 'The *Struggle* for Modernity´ by historians José María López Sánchez and Luis E. Otero Carvajal. Not least, among the supposed foes of science is, in this historiographic approach, the role played by the Catholic Church as a deterrent to science. At the same time, little is said about the role of civil engineers during the so-called Silver Age in the promotion of science, of scientific institutions and of scientific education and culture at large. Interestingly, however, a number of Catholic institutions played a very active role in these more practical areas of science. In this paper I shall analyze how some historians of science since the mid-1970s have used historical facts as a tool to justify present-day political rhetorics, plaguing historical narratives of science with friends and foes of a so-called scientific modernity, while dismissing the role of both civil engineers and some religious institutions as active agents in the modern sciences.

Popular Resistance against State-promoted Fumigation

- Mathilde Martinais

The medical use of smoke is a long-established practice. Yet, French authorities got interested in them only at the end of the 18th-century, when this technique evolved due to enw anatomical beliefs and chemical discoveries. The state and municipalities diffused some of these fumigations through brochures and supplies of materials. Guyton-Morveau's chemical fumigation notably benefited from this system, for instance. However, practice archives, state papers and the frequently renewed advice to the population put into relief the non-adoption of this state-promoted fumigation by the French. How can this resistance be explained? Why did political authority do not give more weight to these techniques?

A focus on disinfecting fumigation and smoke tho reanimate people give some answers. First, conflicting interests of scientists promoting this fumigation and their political role questioned the reasons leading the state to support some medical methods: were these techniques approved because of their efficacy or due to scientists' relationships? The lack of investments from the government in the spreading of appropriate apparatus is another explanation for this non-adoption of state-promoted fumigation. Yet, the most prominent reason for this resistance lies in empiricism: people trusted more fumigation they used over generations than techniques only described in printed brochures. Individuals selected experience over state-approved scientific discourses, thus questioning governmental strategies to promote medical methods. Imposing new practices without any presentations even had opposed effects on the population.

16:30-17:30 – *Centaurus Round Table on Open Access and Open Science*

Room: **K (auditorium La Fontaine)**

Organisers: Koen Vermeir and Theodore Arabatzis

With the participation of Alexander Sterkens, Publishing Manager at Brepols and Professor Johan Rooryck, Executive Director of cOAlition S.

In this Round Table representatives from Centaurus, the ESHS, and Brepols will discuss with policy makers the mission of the official journal of the ESHS, its recent transformation into an Open Access journal as well as its prospects for the future, in the context of the broader movement in academia towards Open Science.

17:30-19:30 – *ESHS General Assembly*

Room: **K (auditorium La Fontaine)**

19:30 – *Closing of the ESHS Brussels 2022 Conference*

Room: **K (auditorium La Fontaine)**

List of Sessions

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