Book of abstracts

The 4\textsuperscript{th} Norwegian Conference of History of Science

University of Oslo, 20-22 November 2011
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The speed with which the young science of bacteriology achieved world-wide recognition and practice was a notable feature of the late nineteenth-century scientific world. Crystallising, as all modern sciences must, into specialised research strands in the twentieth century, bacteriology developed sites and domains of special interest each with its networks of power, knowledge, collaboration and competition. This paper explores the formative years of the international salmonella community which grew up from bases in London and Copenhagen in the interwar period. The principal interests of this community lay in the identification and classification of new types of salmonella according to their preferred laboratory method, and they actively sought to establish scientific hegemony through personal communication and patronage. At the same time, patterns of geographical interest in the salmonellas were shaped by the local prevalence of the organisms and the nature of the problems they presented for different human societies. Although the most virulent of these bacteria for humans, salmonella typhi, has a worldwide distribution it appears to be specific to humankind. Its lesser cousins, the food-poisoning salmonella bacteria, may afflict humans and or animals in varying degrees, depending on individual characteristics and dosage. In their pursuit of these organisms, and their attempts to classify them, the scientific salmonella community began to uncover geographical patterns of microbial distribution and migration. These discoveries attracted further scientific attention, which, with changing institutional structures and personnel, were to reshape the community’s geography and sites of power, and challenge its methodology, in the post-war era.
Geographies of Chemistry in the Late Eighteenth Century

The practice of historical geography has gained a good deal of attention in the last years, its usefulness for renewing our understanding of the history of science well expressed by this conference’s call for papers. In my lecture I want to focus on one aspect of this productive reconsideration, by underlining the importance of speaking of geographies in the plural in relation to the history of science, as the conference title does. Drawing on the case of late eighteenth-century chemistry, I will argue that there are two, closely related, reasons for speaking of historical geographies rather than the historical geography of chemistry. As historians, we examine the past, both as embodied in the primary sources we encounter and interpret, and through the lenses of various historiographical traditions. Beginning with Antoine Laurent Lavoisier’s own description of the route he followed in his construction of a new chemistry, I will use the first half of my lecture to discuss the various maps projected by historians who have sought to locate the dynamics responsible for the so-called chemical revolution. In the second half of my presentation, I will seek to decenter this topic by shifting my focus from Paris to the port city of Amsterdam and exploring the map of late eighteenth-century chemistry in terms of the interactions between local considerations and global networks of exchange.
Facts in science are called facts because they have been demonstrated as universal. Amongst historians of science it is a common place that knowledge about nature is always locally created and it is the task of the historian to show what are the distinct features of this knowledge claim that makes it universally valid - hence being called scientific knowledge. Over the last decades historians have offered impressive micro studies of scientific knowledge production but have been accused for not providing the big picture. In this talk I will concentrate on the genesis and development of a scientific fact and foremost investigate practices of exchanging knowledge within this growing 19th century scientific network. By doing so I will enlighten the complex cultural and epistemological process of how local knowledge becomes universal.
The Sustainable Society: A History of Science as a Vacation

This talk will review the work of Jørgen Randers (1945), one of the co-authors of the /Limits to Growth/ report of 1972, leading up to the work of the United Nation’s Brundtland commission of 1987. Central in this history is the phrase “the sustainable society” which Randers coined in 1974. In this vision for a viable environmental future, I will argue, he sought to open a new endless frontier for science with the aim of realizing the Christian Kingdom of God on Earth. His chief patrons were within Christian communities, and it is their shared ecumenical hope that came to frame the early understandings of sustainability. These ideas about a sustainable society grew out of a culture in which nature was understood not as a place of work but in terms of outdoor vacationing.
Making lists, making borders: Threatened species and Nordic relations

The Swedish Species Information Centre (SSIC, ArtDatabanken), was established in 1984, as a joint effort by several institutions: the Swedish University of Agricultural Sciences, and the newly hatched Swedish Environmental Protection Agency (SEPA), and initially funded by the Swedish branches of non-governmental organisations such as the World Wide Fund for Nature.

One of the main tasks of the SSIC is compiling so-called “red lists” of threatened species. Red lists are used as a basis – though not legally binding – for environmental conservation action at regional and national levels. “Red lists” were first compiled at the behest of the International Union for the Conservation of Nature (IUCN) in the 1960s, as a way of assessing and drawing attention to the risk of extinction. At the same time, other international bodies such as the Council of Europe and the Nordic Council of Ministers – formed in 1971 – were initiating surveys of endangered species, involving the classification of vegetation types and the construction of new regional boundaries.

Making red lists involves navigating a complex structure of academic, governmental, and non-governmental organisations. Assessing extinction risks for particular taxonomic entities in particular locations entails negotiating political and geographical boundaries, as well as scientific boundaries. This paper examines the history of the Swedish Species Information Centre and the Red Lists as a way of exploring the co-production of biodiversity science, and political and institutional structures.
Mapping life, representing science

“We are trying to map the building blocks of life.” (Uhlén 2008)

“A complete catalog of life on Earth ranks near the top of biologists’ all-time wish list.” (Science 2005)

In 2002, two very different projects were launched in Sweden, both with the aim of mapping life. Mathias Uhlén and his research group began work on the Human Proteome Atlas (HPA), an ambitious endeavour to investigate the human proteome using antibodies. In the same year, biologists at the Swedish Species Information Centre and Uppsala University, initiated the Swedish Taxonomy Initiative (STI), a project aiming to record all species found within the Swedish borders. Both projects were well funded – some would say extravagantly so, for their respective research fields. However, both came under fire from funding agencies and fellow scientists, who challenged their funding, their methods, their usefulness, and whether or not they qualified as “science”.

In comparing the HPA and the STI, we want to explore the scientific status of biological inventories in the twenty-first century. The questions about science raised by Daston & Galison’s “images of objectivity” in an eighteenth-century context take on new meanings when examined in the light of contemporary discussions about environmental monitoring, medical applications, and the point at which “data” become “science”.

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Geography and the DNA Story

In 1953 James Watson and Francis Crick “discovered” the structure DNA. Since then the story of how that discovery was made has been repeatedly told. The extensive literature on the subject hardly focuses on the significance of geography for the discovery made by Watson and Crick. In this paper, I shall try to bring forth a few aspects that may illustrate the importance of geography – of how certain elements important for the work of Crick and Watson were located in space, and of how such elements “travelled” geographically.

I shall focus on the significance of the laboratories where some important actors did their work, and of how those laboratories were managed, looking at some characteristics of the Cavendish laboratory in Cambridge, and of John Randall’s laboratory at King’s College and J.D. Bernal’s laboratory at Birkbeck College in London. Further, I shall look at how the location and movement of important scientific information, for instance the idea of building models in order to solve problems of molecular structure, influenced the search for the right answer and the outcome of that search. This will bring into focus the such actors of the drama as the American chemist Linus Pauling, the young Norwegian chemist Sven Furberg, working at Birkbeck College, and some foreign guests at Cavendish, not belonging to the “DNA team”, but still bringing essential information to the Crick’s and Watson’s efforts.

In this way, I hope to indicate how a closer look at factors of geography may contribute to, add to – or even change – the “DNA story”.
Home and away, mimicry and travelling: Hans Pettersson and the transferring of oceanography

This paper concerns the Swedish physicist/oceanographer Hans Pettersson (1888-1966). Focus will be placed on a tension between home and away in the transfer of knowledge, culture and identity in oceanography.

Pettersson received a PhD in physics in Uppsala, but travelled throughout his career: early on to London and later to the Radium Institute in Vienna. In 1947 he headed the scientific voyage Albatross which sailed around the world. Nevertheless, home had a special meaning. In the 1930s, Pettersson moved into oceanographic research founded by his father, chemist Otto Pettersson. He also moved to his father’s institute on Bornö on the west coast of Sweden.

The paper will explore the relationship between two ways of transferring science. How did Petterssson’s journeys shape an identity that was culturally intelligible in Sweden, London and Vienna? Conversely, how did the family and home affect him? Can we speak of copying within the family as a form of transferring knowledge and scientific life?

Above all, I wish to explore the linkages between mimetic processes in the family and travel patterns in the international community. This connection is crucial in approaching ways of transferring knowledge, culture and identity. Moreover, I will argue, both mimicry and travelling were decisive features in shaping the scientific community that Pettersson was part of: both practices helped to keep the community stable enough to produce knowledge as well as new scientists.
A Wanderer Above the Mist – B. M. Keilhau and the Romantic movement

In the historiography of science in Norway the geologist B. M. Keilhau (1797-1858) is remembered as the founder of his discipline, but also as a man who got it wrong. His *naturphilosophische* convictions led him to defend a position which became seen as increasingly obsolete and misguided. As a young man he had been on the cutting edge of science.

In 1824 Keilhau guided the Romantic H. Steffens on a mountaineering tour. Atop mount Synnfjell Steffens ceremoniously passed on his ambition of studying the Norwegian mountains within the framework of his *Inneren Naturgeschichte der Erde*. The story of the ascent and the transaction between the two men on the summit became well known, even providing motifs for fictional narratives. In his memoirs Steffens describes Keilhau as a product of the very nature he had set forth to study; ‘ein ächt norwegische Natur, an das harte Leben des nordischen Landvolks von Kind an gewöhnt.’ He was the very image of the romantic hero; a character straight out of a novel by Tieck or a canvas by Friedrich. It was this connection with the local Norwegian nature and its people which set Keilhau apart as a worthy successor to Steffens’ cause.

In this paper I wish to explore the role of field geologist as a Romantic hero, as well as Keilhau’s perceived role as both scientist and "native". This role, it seems, was not related to Enlightenment ideas about local amateur collaboration in the pursuit of science, but rather with Romantic – and National Romantic – ideas about who was in a position to understand nature on a fundamental level.
The geographies of female medical knowledge production: Medical Women’s International Association

In my paper, I explore the geographies of knowledge production inside the Medical Women’s International Association (MWIA) in the Interwar Years. I will follow the journey of medical knowledge from the national over a regional, to an international arena. In particular, I will concentrate on the shifting role and impact Norwegian female physicians and their research had inside the MWIA.

In 1919, the MWIA was founded for the purpose of producing international medical knowledge on women’s health and for empowering women in their medical career. In 1919, only two national member organizations for female medical doctors existed: An American and a British Medical Women’s Association. For other countries, such as Norway, Sweden and Denmark the MWIA was a driving force to establish national associations for female physicians. In the early years the “smaller countries” expressed fears of marginalization and domination by the bigger countries. In my paper, I will explore in how far this concern was justified and investigate how much space the Norwegian physicians were able to take – and how much space and impact was granted to them.

My presentation draws on archive material of the MWIA that is located in the Archives and Special Collections for Women in Medicine, Drexel University, College of Medicine. In particular, I will make use of reports on scientific conferences. An important case will be the conference on legal protection of women workers from 1931.
About men and instruments: The Norwegian Auroral Expedition to the Arctic, 1902-03

In 1902, the Norwegian professor Kristian Birkeland organized an expedition to the Arctic for studies of terrestrial magnetism, aurora borealis and cirrus clouds. Field stations were established in North-Norway, Novaya Zemlja, Iceland, and Spitsbergen. This expedition has been discussed earlier, for example in a national and political context, and from the perspective of modern physics. Here, I will focus on scientific practice at the stations: the staff and their use of the instruments.

I will discuss how not only the instruments themselves, but also how equipment, buildings, camp-facilities, as well as the manual work performed by the expedition members, all contributed to produce the final results: magnetograms that Birkeland later used to draw his conclusions.
A controversy about geometry textbooks in Norway 1835-6

Bernt Michael Holmboe (1795–1850) wrote the textbooks in mathematics that were predominantly used in the learned schools in Norway between 1825 and 1860, and he was one of the most influential persons in the development of school mathematics in this period. His way of presenting the subject matter was, however, challenged by his colleague and former mentor, Christopher Hansteen (1784–1873).

Holmboe’s textbook in geometry came in four editions, 1827, 1833, 1851 and 1856, and Holmboe’s presentation of the subject matter was in many ways traditional and Euclidean. Hansteen wrote a textbook in 1835 where he challenged this way of presenting geometry. The controversy that broke out between Holmboe and Hansteen was very bitter, and the polemics that followed in the newspapers has later been called the «dispute about parallelism». The core of it was whether one in mathematics education should – as in the case of Hansteen – let utilitarian considerations overrule logical deduction and theoretical thinking. Both Holmboe and Hansteen published pamphlets where they justified their views.

I will in this presentation present the textbooks by Holmboe and Hansteen, and focus on the dispute between them. The newspaper polemic took place in Morgenbladet in 1835/36, and in Den Constitutionelle in 1836. By an analysis of these newspapers, and the two pamphlets, I hope to throw some light on the didactical debate, and certain features of the development of mathematics education, in the first half of the 19th century in Norway.
The Dissemination of Continental European Medicine into Nineteenth-Century Sweden

This paper traces the travels of several Swedish physicians who visited the continent to improve their skills and knowledge and follows them as they took up positions in rural parishes and institutions upon their return. The purpose is to examine the rationale they gave for going abroad and their choice of destination, and the implications of their travels for the patients they treated when they returned. It also demonstrates the importance of professional and personal contacts for the expansion of academic medicine. Such an approach emphasises the power of these 'informal' networks and holds them, rather than state bureaucrats, responsible for medical innovations.

The applications that these practitioners submitted before commencing their travels and the reports they wrote upon their return offer a window not only into the state of 19th-century medical knowledge, but also a glimpse of Sweden’s place in the medical world. While some perceive Sweden as somewhat peripheral to the major developments occurring on the continent, it is worth noting that some Swedish physicians were surprised to learn how far advanced medicine in their country was in comparison to that practised in some of the most renowned European institutions.

Finally, this work is at least partially framed by core-periphery models although recognising that areas designated as cores and peripheries are time and space dependent. It also acknowledges recent scholarship in concepts of borderlands and frontiers that have attempted to introduce a more nuanced understanding of the relationship between different regions.
Attempts to Norwegianise the ‘polar regions’ in the north through scientific activity were not at all sensational or particularly Norwegian. On the contrary, Norwegian scientists preoccupied with the Arctic, were a part of a long tradition with their scientific colleagues throughout the West. Trevor Levere has in his book *Science and the Canadian Arctic* from 1993 pointed out that mapping by natural scientists played a decisive role in the construction of a new nation and the development of a national identity. In the U.S.A. William H. Goetsmann has studied how the ‘West’ was won and incorporated into the nation; it was americanised through geographical and geological mapmaking (*Exploration and Empire*. 1966). John McCannon has in his book *Red Arctic (1998)* studied "The Arctic Myth" in Russian history and the Russian exploration in the Arctic, and how this was an important element in the construction of the Soviet Union. In Scandinavia, polar research and other related research in northern Sweden contributed to the national self-assertiveness and reorientation that could be observed in Sweden during the second half of the 19th century. The sciences, particularly the natural sciences, also contributed in vital ways to the growing understanding of the Arctic. It was ‘through the lenses of science that the portrait of the north emerged." (*Narrating the Arctic*. Ed. Michael Bravo, Sverker Sörlin. 2002).

In Norway science played an integral and vital role in the consolidation of the Norwegian state and in attempts to bring new land under Norwegian control. The incorporation of Svalbard into Norway and the unsuccessful attempt to win Eastern Greenland in the 1930s are Norwegian examples of this process.
Knowledge about ocean currents has been collected for centuries, through experience and deliberate study. Deep currents however, have only for one and a half century been subject to systematic study. In this period, oceanography was defined through the development of new ways of studying deep currents. A mathematical approach became dominating, in which currents were calculated on the basis of collected data on temperature and salinity. Direct measurement of ocean currents was initially marginal as a method in this field, partly due to the huge practical difficulties involved. Nevertheless, in the first half of the 20th century, oceanographers from Scandinavia made considerable efforts in developing methods for conducting precise and reliable current measurements.

The paper will discuss some aspects of the geographies of current meters from this period. Specific conditions in specific areas of the sea – such as the Norwegian Sea and the East Siberian Sea - including climate, remoteness from land, and depth - were crucial in shaping some of the current meters that were developed in this period. Later, these instruments came into use all over the world. Through a few examples, I will discuss some of the local and global aspects of the study of ocean currents and of the related instrument development. I will put forward the argument that the construction of certain current meters had geographical contexts that influenced the instrument’s final form and function. If instrument construction has its specific geography, how does this influence the science in which the instrument is later used?
Roald Amundsen – explorer, reflective practitioner and facilitator of science

Roald Amundsen’s active life as an explorer coincided with a period of important changes in the earth sciences. The purpose of the present paper is to situate some of his endeavors in their relationships to those trends. On the one hand there was a continuation of empirical traditions in field sciences driven by the same inductivist approach that motivated the First International Polar Year 1882-83. On the other hand they were major advances in instrumentation, plus a strong professionalization of research. The latter involved new mathematical methods used by hypothesis-minded geophysicists who probed the dynamics of physical processes. In this context Amundsen was what Fridtjof Nansen called a ”scientific explorer”. The paper traces some of the tensions engendered in this role midway between two scientific trends while at the same time the explorer’s public image followed the tradition of popular geography steeped in nationalism and prestige that drove the steeple-chase of being first to set one’s foot on and attach names to hitherto undiscovered places. It is shown how several of Amundsen’s expeditions resonated strongly with contemporary trends and interests in scientific societies, especially in Norway. At the same time he was pulled between loyalty to science and an unending quest for recognition as a dashing explorer. Since much has been written about Amundsen’s sportive and adventurous side, not least in connection with the dramatic race to the South Pole, the focus in the present paper is chiefly on his relationship to science, an aspect all too often glossed over. First Amundsen’s position as a reflective practitioner is characterized and highlighted. Secondly, the international scientific context of his expeditions is outlined, and, third, a careful assessment is made of the scientific results and their reception in a number of disciplines. It is found that although never a scientist himself, Amundsen’s initiatives definitely led to a lot of empirical data that was valuable when reduced and interpreted by scientists. Even more important his expeditions or projects helped further the scientific careers of a number of brilliantly resourceful persons.
Christopher Hansteen and the Mapping of Terrestrial Magnetism

In the early nineteenth century the study of terrestrial magnetism was central for the development of international collaboration in the sciences. Along with the conceptual and theoretical disputes involved it also necessitated the development and distribution of new scientific instruments, methods of observation, systems of standardisation, and modes of visual representation. More specifically, while the geographically distributed phenomenon of terrestrial magnetism required observations from all over the globe, maps simultaneously became a central mode of representation within the sciences and particularly in the study of terrestrial magnetism.

A leading researcher in this development was Christopher Hansteen, a Norwegian professor of applied mathematics at the University in Christiania. I will explore his contribution during two decades from his publication of Magnetismus der Erde (1819) until his refutation by Gauss in Allgemeine Theorie des Erdmagnetismus (1839). For almost two decades Hansteen was a major influence internationally and especially in Britain for what eventually became «The Magnetic Crusade», and while focusing on the circulation of his theories, instruments, standards and techniques, and his many magnetic maps, I will show how Hansteen was crucial for the systematic mapping of terrestrial magnetism on the British Isles. Still, Hansteen’s theory and his instrument was gradually dismissed and replaced during the 1830s and, in a sense, Hansteen was wrong, but more interestingly, his decline was also related to both the changing nature of science and the function of the magnetic maps themselves. What initially was supposed to be a tool for magnetic navigation, eventually became a scientific mode of representation.
Mapping the Mountains: Railway Politics and Geographical Knowledge in the Norwegian Parliament 1875-1898.

Between 1875 and 1898, the Norwegian parliament discussed the building of a railway line between the capital Kristiania and the port Bergen at the Western coast. The “Bergen line” should diminish the distance between these two towns, consolidate the nation, integrate isolated parts of the country, and stimulate economy and tourism. However, it was far from certain that it would be possible to conquer the mountains by rails, and to build a railway braving snow and storm.

In this context, geographical knowledge took its seat at the parliament. Never before have geographical – geological, climatic and topographical – data had a similar importance in political debates in Norway. The territory was studied, measured, mapped and structured by the technical and scientific elite, and it was discussed to the minutest detail by the delegates.

In my paper, I will trace the “travel” of scientific knowledge in connection with railway politics, and identify three aspects of it. Firstly, geographical knowledge travelled from the mountains to the capital, from the periphery to the centre. Secondly, it travelled from the scientists and technical experts – the engineers, architects, geologists, surveyors and cartographers – to the politicians. And thirdly, it travelled from being scientific research results to be used as political arguments.

The topic presented in the paper is part of my PhD project on the role of infrastructure development in the Norwegian nation-building process, focusing on railway debates between 1840 and 1908.
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Between the local and the universal: medical geography and bacteriology in nineteenth-century Colombia.

This paper shows why the Colombian medical community rearranged its position with regards to what they identified as the scientific center – Europe – in the transition from medical geography to medical bacteriology in the second half of the nineteenth century.

Before the bacteriological era doctors in Europe, America, and Latin America considered periodic fevers such as yellow fever to be produced under specific geographical circumstances (medical geography). Colombian doctors claimed that they were able to question European theories and produce universal knowledge about these fevers because, in contrast to their European’s colleagues, they had direct clinical experience of the fevers in the site where they were actually produced. Practicing medicine in the tropics was an advantage for them since geography was the place where their objects of enquiry –diseases- and knowledge were “naturally” produced.

With the arrival of the germ theories and technologies, arguments about the possibility of producing original knowledge about periodic fevers and other pathologies declined. Colombian doctors accepted the international hypothesis that yellow fever was caused by a microorganism despite the intense controversy surrounding the nature of this agent. And although the epidemiology of the fever seemed difficult to explain following Pasteurian notions only, it seems clear to them that new knowledge about yellow fever was being produced not just where the fever occurred but elsewhere. Thus, I show how Colombian doctors struggled with the displacement of the site of knowledge production –from the “local” geography to the “European” laboratory- and how this changed the way they understood and dealt with yellow fever.
A Norwegian Sublime?

The so-called discovery of the Norwegian landscape as an object for aesthetic contemplation and as a motif in art is commonly linked to important changes in western attitudes towards nature around the late eighteenth- and early nineteenth century. In this reevaluation of wild nature, the concept of the sublime is seen as playing an important role. Still, the reception of the concept of the sublime in Norway seems to be under-investigated. The aim of my paper is to address the following question:

How did ideas about the sublime travel to Norway, and how were they accommodated and appropriated in a Norwegian context?

More particularly these questions will be discussed in relation to a lithograph and a short text about the waterfall Sarpsfossen, both published in the ‘voyage pittoresque’ Norge fremstillet i Tegninger (Sketches of Norway) in 1848. The lithograph is based on a painting by the Norwegian artist Joachim Frich (1810-1858), and the text was written by the Norwegian writer and scholar Peder Christen Asbjørnsen (1815-1885).

Looking at artistic training on the one hand and on critical/philosophical discourse on the other, I will attempt to compare how Frich and Asbjørnsen use and modify ideas about and conventions of the sublime that were already established elsewhere.
Early Modern Travel Writing

Interest in travel writing was enormous in the early modern period, resulting in the publication of vast multi volume compilations of travel writing being presented to the public from the beginning of the 16th century at least until the middle of the nineteenth century in several European countries. The production of travel knowledge is an example of a field that necessarily combined both international and national strategies, and are thus an example of how elements in the production of knowledge moves between and is appropriated by various places. This paper proposes to discuss a few of these compilations, focusing on the English and French collections of Richard Hakluyt, Samuel Purchas, Melchisédech Thevenot and abbé Antoine François Prévost, published between 1589 and 1759.

At a time when modern disciplinary boundaries had yet to be forged, various fields of knowledge crossed paths in the work of these editors, cartography, geography, natural history, anthropology and sociology are examples. While both the production of travel writing and travel knowledge may be understood as belonging to intercontintental networks, the reasons these compilers give for publishing these travel accounts are usually national and thus belong within a local context even though many accounts appear in several collections. In this paper I want to compare these various national strategies and arguments presented by the editors.
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Large-Scale Programmes in the History of Science—Some Swedish Considerations

The latest mantra in research policy, Grand Challenges, is often seen as a buzzword implying calls for very large research projects involving representatives from (at least) the natural, engineering and medical sciences. The underlying assumption is that solutions of present-day economic, environmental or social problems require orchestrated efforts stretching over a multitude of disciplines. More recently, this international trend has started to influence research endeavours also in Swedish history of science. Several unusually large programmes with different aims and scopes as well as institutional and financial prerequisites have surfaced over the past years. In common, they have the involvement of a relatively large number of researchers (not in the hundreds, but well in the teens), more generous funding than is customary in the humanities and a well-planned organizational structure.

The session consists of four short presentations of such endeavours in Sweden and a discussion about advantages and disadvantages with these types of programmes in the history of science:

Chair: Thomas Kaiserfeld (Lund University)

(cont.)
Participants

1) Sven Widmalm (Uppsala University),
“Lessons From the VTI-project (1996-2006), an Early Example of Big History of Science in Sweden”. (A project involving 12 PhD students and a number of senior researchers from four disciplines at the Royal Institute of Technology, Stockholm, and at Uppsala University.)

2) Christer Nordlund (Umeå University),
“The Fuel of the Future? A Research Programme on the Science, Technology and Selling of Biofuels in Sweden”. (A programme that is up and running at Umeå University.)

3) Johan Kärnfelt (Göteborg University),
“Science and Modernization in Sweden: An Institutional Approach to Historicizing the Knowledge Society”. (A project with a pending application at The Royal Swedish Academy of Sciences.)

4) Thomas Kaiserfeld (Lund University),
“Legitimizing ESS: Big Science as collaboration across boundaries”. (A planned effort to involve the humanities and the social sciences in the building of the European Spallation Source, ESS, at Lund University.)

Commentator: Kristina Asdal. (Oslo University)

After these four short presentations and comments, the speakers will form a panel answering questions from the audience.
Communicating Care: Scientific Standards and Moral Values in the Transnational Development of Laboratory Animal Science c, 1956-1986

This paper investigates how laboratory animal science, which emerged independently at multiple sites across many national contexts, was coordinated so as to coalesce about global standards of laboratory animal management and care in the period c.1956 to c.1986. We focus on the formation and work of the International Committee on Laboratory Animals (ICLA) that was established in 1956 with the goal of developing global standards for laboratory animal science. The history of the ICLA provides a challenging prism through which to explore the conference themes because it was initially led for much of the period from the UK by William Lane-Petter (1965-1969) and then from Norway by Stian Erichsen (1969-1979). Our analysis will first explore how, despite the biomedical research infrastructure in these two countries being very different in size and scope, representatives of both could take a leading role in establishing and communicating global standards of laboratory animal science. Second, this paper will show how moral values were integrated within standards of animal care so that cultural orientations toward animals also circulated through the emerging transnational networks of laboratory animal science. By reconstructing the ways in which theories, methods, and instruments of laboratory animal science travelled (as well as the animals themselves), we will relate how changes in local laboratory material cultures informed and were informed by transformations in wider cultural understandings of animals so as to shape emerging transnational regulation of laboratory animal science (for example that of the 1986 EU Directive 86/609/EEC on animal experimentation).
Geophysics and biology in a fishing nation

From the 1890’s, Norway held an international position in marine biology, physical oceanography, meteorology and auroral research, which was far more important than the modest size of the nation would suggest. In my paper I will show that these disciplines constituted a partly interwoven cluster of disciplines, which was a center of gravity in the Norwegian scientific landscape at the beginning of the 20th century, and I will discuss the reasons for this.

The geography of Norway gave Norwegian scientists a comparative advantage, close to the northern light and to the Oceans where the Atlantic Current and the warm air masses meets the Arctic ocean and air masses. Oceanography, meteorology and auroral research was also closely related to polar research and arctic expeditions, which around the turn of the century became important for Norwegian national self-assertion. I will however argue that the most fundamental reason lies in the fact that Norway was a fishing-, whaling-, sealing- and shipping-nation. Therefore, there were technical competence for a type of research that demanded ships and seamanship, and most important, there were a strong demand for the type of knowledge which marine biologists, oceanographers and meteorologists could produce. Meteorology should help seamen and fishermen to travel safely at sea, and the main goal of marine biology and physical oceanography was to contribute to more efficient fisheries and better management of the fisheries.
Science laboratories and geographies of technology – a study of measurement techniques and international citations of Nobel Laureates

This study examines how scientific practices travel (across science disciplines and national borders) with particular attention to measurement techniques, such as Laser Spectroscopy, ESCA - Electron Spectroscopy for Chemical Analysis (now usually described as X-ray photoelectron spectroscopy, XPS). The examination is based on Nobel Prizes awarded for measurement techniques that are important for further discoveries and applications in several disciplines. This is expressed by Nicolaas Bloembergen awarded with Nobel Physics Prize 1981 (together with Kai M. Siegbahn and Arthur L. Schawlow) in his Nobel lecture: “The applications in chemistry, biology, medicine, materials technology, and especially in the field of communications and information processing are numerous. Alfred Nobel would have enjoyed this interaction of physics and technology.”

The interdisciplinary dimension is emphasized by Kai Siegbahn several years before awarded the Nobel Prize (Siegbahn 1974, page 58) noting that results of electron spectroscopy appear in journals like Surface Science and concluding: “Gradually it becomes clear that a surface method like ESCA, being sensitive to all elements in submonoatomic layers and also to the chemical properties, ought to be a valuable complement to other surface methods...”

Results from analysis of Nobel Physics Laureates from 1981 show how their work is subsequently cited by researchers from other disciplines. Furthermore, the study show how skills in the local milieu have a global dimension as measurement techniques (such as the term XPS) becomes recognized internationally, thereby contributing to previous studies of Nobel laureates (Crawford 1992; Norrby 2010, Friedman 2001) through analysis of geographies of measurement techniques.
Smell and taste in the history of chemistry: Textbooks and laboratory teaching in the end of the 19th century

Although seldom visible in scientific publications and articles, smell and taste have always played an important role in chemistry. In order to study this role it is necessary to leave the history of innovations and of theoretical breakthroughs and concentrate on routine activities in daily laboratory work, an important part of which is teaching and learning.

Although the seemingly terminological poverty in describing such phenomena as smell and taste, text books authors tried to reach a level of exactness and precision in their descriptions, indicating both a consensus concerning how smell and taste should be considered, and a will to make these descriptions as scientific as possible. But chemistry could not be learned only by reading books. Basic chemical knowledge had to be learned at the spot, in the laboratory. Discussion of how everyday techniques and how common chemical operations function, that is the handicraft part of science, is therefore an important part of the study of smell and taste in chemistry.

In this paper I will make an attempt to understand how chemical knowledge of such a subjective and qualitative character as taste and smell, was learned in the specific and local situation of a laboratory, how it was communicated, and how it became part of chemistry as a science. It is my hope that a discussion of the role of smell and taste in chemistry will contribute to an increased understanding of everyday chemistry, a precondition for all other chemistry.
Ida and Walter Noddack through Better and Worse: An Arbeitsgemeinschaft in chemistry

When the German chemist Walter Noddack (1893-1960) suddenly passed away in December 1960, he apparently suffered from the heartache of believing his wife, chemist Ida Noddack-Tacke (1896-1978) to be dead. Truthful or not, this Romeo and Juliet-like example illustrates the close emotional bond that seems to have existed between the married couple. Contrary to many collaborators in science whose joint work is often (publicly) credited to the male partner, the Noddacks are often depicted as a “work unit,” an Arbeitsgemeinschaft. Parallel to this, analyses of the contribution by Ida Noddack on nuclear fission have emerged. But despite the many publications on Ida and/or Ida and Walter, little attention has been given to the nature of their collaboration and questions remain such as: Were Ida and Walter Noddack equal collaborators? How did they divide the work between them? Is it possible to identify separate research interests and specialties? How did Ida’s (and Walter’s) work progress as the couple moved from place to place and Walter assumed one position after another? We will use the concept of Arbeitsgemeinschaft to shed light on these questions.

There are many ways to look at collaboration. For the case of the Noddacks, we are privileged to have found rich archival material, including the Noddacks’ laboratory notebooks. Our aim is to go beyond the romanticized description of their collaboration and analyze how they actually shared the work, to which extent they defined their own specialties, and whether or not they shared the reward for joint work.
At war with nature: scientific knowledge, military strategy and Arctic geography

As the Cold War opened, the Arctic region (namely, Greenland, northern Canada and Alaska) became integral to North American continental security. The American desire to control the Arctic was, however, complicated by its isolated geography and harsh climate. Between 1948 and 1966, the American military was entrenched in the ‘other cold war’: the struggle with the Arctic environment which threatened to leave North America vulnerable to Soviet attack. In line with the technological optimism which had underpinned American thinking since World War II, the keystone to the Arctic was seen to be scientific research. This paper uses two scientific case studies to explore the ‘other Cold War’: meteorological investigations of polar whiteouts and glaciological investigations of ice deformation. These case studies illuminate a struggle between two philosophical approaches to nature: a brash, aggressive approach which aimed to conquer the Arctic environment, and a more nuanced approach which aimed to collaborate with and even rely on that environment. Ultimately, I show that the second approach won out as American strategists found détente to be the soundest approach to the Arctic space. In doing so, I argue for a new understanding of geographies of scientific knowledge: I show that the physical location of scientific inquiry can have immense impact not only on the actions of scientists and their patrons, but also on their attitudes towards the fundamental relationship between their work and working space. I also provide new insight into the transfer of scientific knowledge into and out of geographically peripheral regions.
Norwegian-Russian cross border scientific networks in arctic research

Norway and Russia are both northern states, who administer vast maritime zones and land territories in the Arctic. Because of this, in both states we find a distinct northern focus that has occupied a prominent place, not least inside the field of sciences over the last two centuries. During the last decades of the 19th century there developed a handful of so to say specific arctic research disciplines, such as oceanographic studies, meteorology, auroral research and geophysical studies in general, and also research on arctic cultures such as the Sami. Throughout the different sub disciplines of arctic research, Norwegian and Russian scientists have held parallel research interests for over one hundred years. This has led to a strongly felt need for exchange of data and knowledge across the border, and also a desire to conduct transnational studies.

In my paper I will explore the border crossing Norwegian-Russian scientific networks in arctic research app. 1880-1917. I will limit myself to a few dominant figures, such as Fridtjof Nansen, and his contact with Russian colleagues inside the field of oceanography, admiral Stepan Osipovitsj Makarov and count Edvard von Toll. On the eve of Nansen’s first Fram expedition, Nansen contacted von Toll and Makarov, and asked them for advice on his plans. Later he travelled to St. Petersburg and the Russian Geographical Society to discuss the plans in detail. These contacts were maintained and developed in correspondence and also through personal meetings over the following years.
Life and healing in medicine and gold making

In the 1500s the relationship between medicine and alchemy was a close one. Galenic medicine saw aging and disease as results of an imbalance between the qualities in the body. Similarly alchemists sought to purify and balance the elements of metals in order to manufacture gold (Chrysopoeia) and silver (Argyropoeia). The Philosophers’ Stone, a perfectly balanced substance, had the power to transfer its balance to human bodies as well as to metals; cure illnesses, prolong life, and transmute inferior metals to gold.

Alchemy’s extensive use of biological and medical imagery is well known. Traditionally alchemical texts have been seen as intentionally cryptic; the consensus being that metaphors and analogies were used to make the texts inaccessible to the uninitiated. However, recent research has shown alchemy to be less secretive than previously believed. Medical terms in alchemy are more than mere analogies; they express fundamental ideas of the natural philosophy of the period. Alchemical texts describe metals as alive, generated from a seed (semen), they mature and grow in the warm womb of the earth, and die. Metals, like humans, originated, developed and persisted aided by the vital principles heat and moisture.

Alchemical processes were described in biological terms because metals and human bodies shared fundamental characteristics. Rather than concealing the truth, medical and biological terminology in alchemical literature reveal the period’s knowledge of the conditions of life and health.
An opportunity, but also a curse? Hans Pettersson and the geopolitics of oceanography, 1945-1960

The Swedish physicist and oceanographer Hans Pettersson (1888-1966) is perhaps best known to historians of science for his early career in nuclear physics. But he increasingly followed in the footsteps of his famous father, Otto Pettersson, and spent most of his later career involved with deep-sea research. My goal here is not to recover an overlooked episode for its own sake. Rather, I am interested in Hans Pettersson’s oceanographic career as a unique window into the changing geographies of geophysical and oceanographic research after 1945. The explosion of American funding was initially a source of great cheer to Pettersson, whose 1947-48 Albatross expedition had produced a wealth of results that required money and expertise to work up. Despite his sound network of trans-Atlantic contacts, Pettersson was ultimately left disappointed. New administrative structures within bodies such as ICSU (the International Council of Scientific Unions) increasingly became dominated by research with military-strategic relevance, as the Cold War helped create a congenial landscape for politically savvy, almost technocratic specialists. The United States became a magnet that lured Pettersson’s best assistants away. As late as 1948 the Norwegian oceanographer Harald Ulrik Sverdrup could still be lured back from California by promises of a position of scientific strength back home, but Nordic leadership in oceanography and geophysics was gone – a reflection, surely, of a broader geopolitical changes.
Christian Wolff and the ambivalence of Experience

The focus of this paper is on the concept of experience in Christian Wolff’s (1679–1754) philosophy. With the new interest in scientific knowledge production as the result of the relations between scientists and artisans and between centre and periphery there came about a revived interest in concepts such as truth, objectivity and experience. Steven Shapin and Peter Dear argue that the conception of experience was thoroughly transformed as the Aristotelian-scholastic natural philosophy was replaced by the experimental philosophy in the course of the seventeenth century. This conceptual transformation, they argue, reflects two radically different ways of making nature intelligible. In this paper, however, I argue that Wolff’s philosophy fell back on both the old and the new natural philosophy and that it therefore also reflected both conceptions of experience. Wolff, who is known for emphasising the importance of method, relied heavily on the Aristotelian demonstration but at the same time he was deeply engaged in experimental philosophy. The result was a mainly Aristotelian-scholastic model of science to which experimental philosophy was subordinate. With this paper I want to bring to the fore how experience, rather than taking one form, took a number of different forms that also served quite different purposes in his natural philosophy. These notions of experience reflect Wolff’s overall ambition to create a single method that could be used in all science. Rather than an obstacle the new experimental philosophy presented an opportunity to realise this ambition by making the demonstrative method more complete and appealing.
75 years after Oslo 1936: the first International Congress of Mathematicians in Scandinavia

Before Stockholm (1962) and Helsinki (1978) there was one of the quadrennial international congresses of mathematicians, organized since 1897, which took place in Scandinavia. The congress in Oslo 1936 had specific features being the only one during the time of the Nazi rule in Germany and the mass persecution and emigration of Jewish mathematicians. Also the Stalinist regime in the Soviet Union and the Italian war in Abyssinia (Ethiopia) influenced participation. At the same time it was a time of transition in mathematical communication, with specialized mathematical meetings playing an increasing role and leaving a specific, somewhat restricted but in other respects extended function to the big congresses. The talk reports about a book project undertaken by Henrik Sørensen (Århus) and the speaker.
Goodbye to Biology: “I Love my Psychiatrist for Science’s sake!! (yes, now you know it!)

In the June 2011 issue of History of Psychiatry Volker Hess and Benoît Majerus wrote:

“As for the question about the material basis for the assessment and treatment of mental disorders, patient hospital records have become the focus of interest. ... Using these archives (...) opens up new worlds: as the archives locate medical practice in a complex environment, they allow the efforts of the nursing staff, the lived materiality of the space and resources, and the obstinacy of the institution and its protagonists to become more visible.”

This presentation discusses the material basis for the treatment of patients at the first Norwegian criminal asylum, Kriminalasylet, during the years 1901-15. In the late 1890s biological perspectives in Norwegian psychiatry became challenged by the development of the Schizophrenia diagnosis and new sociological perspectives. The presentation focuses how the new ideas, together with a complex asylum environment, influenced the psychiatric practice and scientific thinking of Dr. Hans Evensen.

Evensen was only 33 years old when he was appointed as asylum manager in 1901. He had liberal ideas about treatment and was well informed about contemporary developments in international psychiatry. He abandoned the use of coercive measures and tried to reduce isolation to a minimum.

Hans Evensen was particularly concerned about classification and treatment of criminal and difficult patients. These interests uncover an intellectual curiosity, but his practice also reveals a growing desperation linked to the recognition of not having any available treatments to treat mental illness.
This paper explores how prostitution was framed as an object for scientific studies in the 19th century, and how these ways of knowing fed into new regimes of governing prostitution. It proposes a study of studies of prostitution, or of what I will call 19th century ‘prostitutionology’.

Central to the paper is the legalization of prostitution in Norway and a text by the legal scholar Bernhard Getz from 1892 *Udkast til lov til modarbeidelse af offentlig usædelighed og venerisk smitte*. In the late 19th century a broad European movement articulated a criminal law program that conceived the criminal law less as an expression of morals than a tool for governing society and population. This program was fed by new developments in a number of sciences and the positivist ideology that many of them shared. In particular criminology, as a positivist, empirical discipline, was articulated in close association with the project of criminal law reform. The Norwegian criminal law of 1902 was in many respects a result of this reform movement.

The aim of this paper is to read Getz’ proposal for a prostitution reform against a number of 19th century studies of prostitution, in order to get a clearer picture of what kinds of knowledge that fed into the reform, and also in what way the problem of government framed these studies. The presentation will focus on three seminal works: A. Parent-Duchatelet’s *De la prostitution de la ville de Paris* (1836), P. Tarnowski’s *Etudes anthopométrique sur les prostituées voleuses* (1889) and Cesare Lombroso’s *Criminal woman, the prostitute, and the normal woman* (1893)
Circulating leprosy

Most enquiries into the history of leprosy have been delimited geographically; whether it is through studies of institutions, districts, countries or empires. Two seemingly contradictory conclusions can be drawn: On the one hand, similar policies were put in place in vastly different places around the globe at roughly the same time. Leprosy was the rationale for building asylums and ‘leper camps’. On the other hand, the studies show that different practices took place in different locations, and that each place has a unique story. How do we, as historians, get to what these histories have in common, and not lose grasp of what makes them unique?

This paper will argue that the commonalities can be explained through studying the circulation of knowledge; the movement of people and the movement of things (such as remedies, medical texts or correspondence). In addition to traveling and reading publications from afar, some researchers consciously aimed to overcome their local limitations by establishing infrastructures for international collaboration and exchanges of knowledge, especially through international conferences, associations and journals. Through this circulation, leprosy became a global disease. When focusing on practices within a specific location, the movement of knowledge tends to be given less emphasis than it deserves.

The ‘globalization’ of leprosy will be presented in three phases. First integrated in local and national (often, colonial) medicine (->1897); then with a shared tri-lingual and predominantly European journal as the centre (1900-1914); and finally as a disease apart in the League of Nations Leprosy Commission (1924-1939).
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Geographies of Sound - Acoustics in the Interwar Period

The soundscape of the modern world changed drastically with the arrival and spread of electroacoustic media technologies. The speed of sound, known as 332 metres per second, started to change in the late nineteenth century. With the telephone, and later radio broadcasting, sound started to travel literally at the speed of light, first on smaller distances, and finally around the globe. Sound recording, reproduction, and the manipulation of architectural spaces added to the spatial and temporal disentanglement of sound.

Spread of technological systems and systems of knowledge that came with the media technologies followed different rules. Actors operated local, national, and global, and included the state and private enterprises, such as telephony and broadcasting corporations, military, electrical industry, universities and technical schools, and amateurs. The technologies and bodies of knowledge that followed with them crossed all kinds of borders and followed a transnational regime.

Based on the example of Johan Holtsmark at the Norges Tekniske Høgskole, who established himself and his assistants as the foremost experts in acoustics in interwar Norway, I will elaborate on how and why this expertise was produced and consumed locally, and how the Trondheim acousticians were connected in the transnational field of acoustics research and development of the interwar period.
The Geography of Early Medical Studies: Travelling Knowledge, Images and Practices between Italy and England

This paper attempts to analyse the geographies of Italian-English medical knowledge transfer in Late Middle Ages and Renaissance. It was in Italy where the pioneering centres of the then medical studies were located – Bologna, Padua, Pavia or Ferrara. From there, the newest findings and influential treatises spread across Europe.

When examining this transfer of knowledge, I will focus on three main aspects. Firstly, ideas and findings travelled not only codified, but also embodied – via personal exchanges (Wenger 1998; Lave & Wenger 1991). English scholars and students were leaving for Italian universities, bringing home new expertise (Linacre, Caius, Harvey), while Italian medici were acting as royal physicians or university lecturers in England. These individuals also became involved in scholarly networks of that time. Secondly, medical images and practices were also a part of the process. Concerning the former, it was anatomical drawings in particular which profoundly changed the perception and understanding of human body. In terms of the latter, however, it is rather difficult to trace the transmission of practices as we have almost no material proof of them. Nonetheless, with the help of auxiliary methods, we are still able to deduce the prevalent patterns of how practices were passed on. Thirdly, the importance of place where the knowledge was produced and also received will be emphasised. Since the medical studies and practice have always been performed in certain geographical locations, it might be said that they have been locally embedded (Livingstone 2003; Naylor 2005).
“The curious way to observe weight in Water”: Francis Bacon, Thomas Harriot and specific gravity.

In his *Phænomena Universi* (most likely written in 1611) Francis Bacon included a table of specific gravities of 73 substances. While some have suggested that Bacon learned the method of measuring specific gravities from Marino Ghetaldi, who published his *Promotus Archimedes* in 1603, a letter from William Lower to his friend Thomas Harriot offers another possibility. In the letter, dated 1610, Lower expresses his concerns regarding Harriot's lack of publication, and mentions that Harriot had taught him «the curious way to observe weight in Water, and within a while after Ghetaldi comes out with it in print». We know that Bacon knew of Harriot, and it is possible that he knew Harriot’s Archimedian experiments. At the same time we know that there was an Archimedian revival in Italy in the middle of the 16th century, and that both Harriot and Bacon knew the work of some of the Italian natural philosophers. It is the intention of this paper to examine the circumstances surrounding Harriot and Bacon's work on specific gravities during the first decade of the 17th century.