

Science in Context

<http://journals.cambridge.org/SIC>

Additional services for ***Science in Context***:

Email alerts: [Click here](#)

Subscriptions: [Click here](#)

Commercial reprints: [Click here](#)

Terms of use : [Click here](#)



Introduction: Science, Technology, Medicine – and the State: The Science-State Nexus in Scandinavia, 1850–1980

Kristin Asdal and Christoph Gradmann

Science in Context / Volume 27 / Special Issue 02 / June 2014, pp 177 - 186

DOI: 10.1017/S0269889714000039, Published online: 29 April 2014

Link to this article: http://journals.cambridge.org/abstract_S0269889714000039

How to cite this article:

Kristin Asdal and Christoph Gradmann (2014). Introduction: Science, Technology, Medicine – and the State: The Science-State Nexus in Scandinavia, 1850–1980 . Science in Context, 27, pp 177-186 doi:10.1017/S0269889714000039

Request Permissions : [Click here](#)

Introduction: Science, Technology, Medicine – and the State: The Science-State Nexus in Scandinavia, 1850–1980

Kristin Asdal and Christoph Gradmann

One of the common characteristics of science, technology, and medicine is their ambition to epistemologically and organizationally move beyond the confines of nation states. In practice, however, they develop differently in countries or regions. Scientists, engineers, and physicians are constrained as well as enabled by national boundaries and specific cultures. The cultural status of such practices in reverse is influenced by a country's history, politics, and the view of the role of science, technology, and medicine in society. It is the relation between a specific region, Scandinavia, and the history of science, technology, and medicine within this region that this issue of *Science in Context* sets out to explore. But what is this “Scandinavia”? To many, Scandinavia besides being a specific geographical region of three countries (Denmark, Sweden, and Norway) with entwined histories and closely related languages is a way of denoting a specific style or movement. “Scandinavian design” is renowned for three interrelated features; minimalism or simplicity, functionalism, and “design to the people” i.e. functional products for the average citizen (Beer 1975; Glambek 1997; Fallan 2012).

The issue of design however has also been intimately coupled with the question of democracy: Outside Scandinavia this region has become famous for its efforts and initiatives to extend democracy to the work place and for both promoting and demanding that workers be allowed to take part in decision making when it comes to the introduction of new technology (see e.g. Bjercknes et al. 1987; Ehn 1989). Hence, Scandinavian societies have been put forward as democratic utopias (Asdal 2008a). Particularly relevant for the questions that we deal with in this special issue on science, technology, and medicine in Scandinavia, is that technology and democracy do not seem to be understood as necessarily in opposition to each other (see Suchman 1988; Myklebust 1997). Social relations and technology seem rather to have been regarded as more closely and indeed also potentially more peacefully intertwined. If this is the case, it is interesting to note another feature, namely the Scandinavian way of signaling that the good way of living is to be living in or with nature (Witoszek 1998). So how do these elements go together? Does this signal a pragmatic approach to technology – and a way of relating to technology which does not see it in opposition neither to democracy nor to nature? And are functionality, an involved user, an egalitarian and socio-technical approach, as well as the equaling of the good with the natural traits that we can use also to characterize science-society relations in Scandinavia more broadly from the late nineteenth century to about 1980?

Approaching Scandinavia

The assumption that there has been a particular “Scandinavian design” or a particular way of enacting Scandinavia when it comes to science–society relations provides our, the editors’, point of departure. However, in which ways do features such as minimalistic style or the equating of the good with the natural connect to the history of science, technology, and medicine? Can labels that have been associated with design possibly also indicate something important for the understanding of science, technology, and medicine? It is not our ambition to give any definite answers to such questions. Instead we want to provide case studies that relate to those questions and their answers. In their entirety they convey the idea that looking at science–society relations is indeed a way to grasp the specificities of that region, Scandinavia. We seek to hold up what might perhaps be seen as two quite different, even conflicting, approaches: On the one hand we want to draw the reader’s attention to the idea that there might be a “Scandinavian way”: This, we argue, has to do with a particular way of performing the collective: Scandinavia has been enacted by way of its specific science–state relations. Hence, the science–state nexus is just as important to explore as the science–industry nexus that has been given so much prominence in studies of science–society relations. On the other hand, just as much as we point to a possible and particular “Scandinavian way,” we do not want to treat Scandinavia as a given, as an already established context for exploring particular science–society relations. Rather, we focus on the ways in which science, technology, and medicine have indeed taken part in enacting Scandinavia as a particular collective. The case studies we provide attend to the scientific practices; the ways and means through which such collectives as “Scandinavia” come into being. In doing these moves – addressing the science–state nexus on the one hand, and the collective–making on the other – the ambition is not only to cast light on a particular region, Scandinavia and the interrelated histories of Denmark, Sweden, and Norway. We also want to address more general issues in the study of science, technology, and medicine that we will come back to towards the end of this introduction.

The Science–State Nexus versus the Science–Industry Nexus

Based on earlier research our hypothesis is that in comparison with a range of other European countries, the status of the basic sciences in Scandinavia has been relatively weak. Science as an esoteric or exemplary form of knowledge, or truth seeking practice, has not held a prominent position (e.g. Asdal 2008b; Hestmark 1999). This suggests that the science–society contract may have taken a distinct form in which particular emphasis has been placed on the users of scientific knowledge and the use, utility, and applicability of science in society.

It is widely recognized that solutions to the problem of knowledge are simultaneously solutions to the problem of the social order (Shapin and Schaffer 1985; Jasanoff 2004).

Despite this link, politics and science cannot be reduced to one another. Apart from linking up with the established label of “Scandinavian design” a potentially fruitful way of exploring these relations is to start from influential work on what we might call the contract governing the relation between the economic sphere and that of politics. The notion “democratic capitalism” has been coined for the Norwegian case (Sejersted 1993 and 2011; Byrkjeflot et al. 2001) underlining the significance of the state to economic development. It has been argued that Norway has followed a *Sonderweg*, a specific regional trajectory, in which the state has taken on a distinct and active responsibility in enabling economic development. This has been coupled with strong democratic norms of equality, codetermination, and the will to regulate, intervene in, and govern economic life and its actors. Sweden in particular has also been credited with an interventionist political tradition of such a fashion.

An influential body of literature on Scandinavian history and politics demonstrates interesting forms of co-production between the economy and political culture on the one hand, and between socio-political features and democracy on the other. Together these lines of work suggest the coming into being of a distinct social and economic order and distinct egalitarian versions of democracy that favor an interventionist state (see e.g. Byrkjeflot 2001; Christiansen 2006; Moene and Wallerstein 2006). Interestingly, however, science, technology and medicine have, so far, played a relatively inconspicuous role in these narratives. This omission can be rectified. Our suggested point of departure can be put into the following question: To what extent has the conjuncture of strong states and egalitarian democracy shaped science, technology, and medicine as much as it is known to have shaped capitalism?

One of such dynamics that we pointed to above has to do with science-state dynamics. Influential contributions to the history and sociology of science have analyzed what has been conceived as “the invisible industrialist” (Gaudillière and Löwy 1998). As Hans-Jörg Rheinberger has put it with reference to biotechnology it might no longer be discernible to define where science stops and industry starts (Rheinberger 2004; see also Walsh 2004). This implies that certain forms of industry condition science. The industrial form of research has resulted in changes in the epistemic core of science to an extent that it may even come to define that very practice (Rheinberger 2004). To this science-industry nexus, we would like to add the science-state nexus by investigating the example of the specific form it has taken in a region: If there exists something like a Scandinavian order to science-technology and medicine, this order has just as much to do with the invisible – as well as the highly visible – state. In Scandinavia, the state conditions science. Is this the case to the extent that a “governmental” form of life reaches the epistemic core of science and even defines what it means to do science?

Many of the contributions to this issue touch upon the science-state nexus in one way or the other. Firstly, and quite straightforwardly, this has to do with the ways in which science takes the form of political technology (Asdal 2004); science – broadly conceived – is one of the ways in which political ends are sought and achieved

(Foucault 1991), for instance the control over territories. This however is pursued in locally specific ways. It becomes graphic in Sverker Sörlin's analysis of how polar science was influential in creating a polar region that no longer sat peripheral on the world map and instead became a stage for Scandinavian global politics. Partly related to this, are ways in which science may facilitate the creation, in more indirect ways, of a sense of a cultural identity and history. Peter Kjæregaard thus analyzes the fate of Danish aspirations to enhance this nation's cultural status by claiming a "proper" stone-age lineage in the *Homo gardarensis*. In analyzing this as part of our histories, the point is not to reduce science to external interests or political or state-objectives. Rather, the point is to find ways to analyze such exchanges at different levels and to focus on feedbacks between those spheres rather than on traffic in either direction. Just as we can not only study the movement from science to industry (as originally perceived in the linear model that no one nowadays acknowledges they ever believed in), we should not only study the movement from science to political ends. We need to show similar concern to the reverse movement (cf. Rheinberger 2004): the ways in which politics, in small pieces, may come to shape the different versions of science.

Pointing to the state and its significance in relation to science is of course nothing new. Still, the challenge remains to develop ways of grasping this nexus in a non-reductionist way and to give rich narratives of different roles that state-dependency and state-intimacy may have played in making up a region. We started out with linking up science, technology, and medicine in Scandinavia with "Scandinavian design": a functionalist style, an approach directed towards the average citizen, and objects made to be used. Linked to this, we pointed to the image of the good life as that of living in and with nature. Again, to establish a definite link between a particular Scandinavia design and a particular way of doing science, technology, and medicine, has not been our objective. However, if we acknowledge the existence of both a science-state nexus and a science-industry nexus, this leaves us with an interesting space for exploring how these may go together, interact, or even clash and confront each other.

Earlier contributions to the history of science and medicine in Scandinavia have analyzed how medicine, e.g. pharmacists, were proud not to sell medicine (Hamran 2010); the less the better. Others have analyzed the attempt to establish a pharmaceutical industry in Norway, which never came to flourish (Sogner 1997). A corresponding strategy to increase the intake of vitamins failed since it met with a widespread belief in "the natural way": a way of living that relied on a healthy diet instead of consumption of synthetic products.

As Anne Kveim Lie's paper touches upon as well, the Scandinavian story when it comes to antibiotics points in the same direction: A resistance to the extensive use of antibiotics in favor of a reliance on nature's own, the body's capacity to resist illness. Asdal's paper sketches a parallel story when it comes to the question of the nurture of infants. The "natural way" – i.e. mother's milk as the infant's nurture – came to be promoted as an integral part of everyday culture. An important aspect of these stories is that science and medicine ended up being positioned in opposition to a

science–industry nexus. Medicine partly took the form of a critique of industry – arguing e.g. for “natural” restraint rather than (industrial and economic) growth. Hence, drawing distinctions between the science–industry nexus on the one hand and the science–state nexus on the other, can be of help in getting a grasp of these various and shifting features of science.

An Entangled Multitude

So what are the significant relations and differences between the Scandinavian countries when it comes to science–society relations? We think that the national trajectories are best understood as being part of a multitude of variations within a common frame of developments in three countries that evolve with an eye on each other. Variations, however, do matter. Already our initial hypothesis regarding the (relatively) low status of the basic natural sciences and the low esteem in which science as a truthseeking practice is held, has to be further qualified for the Swedish example. At the turn of the twentieth century there had been a balance between the human sciences and the natural sciences. Subsequently, during the interwar period, the natural sciences doubled in size as compared to the human sciences. From there the natural sciences developed into the model for how to pursue science. The Swedish dominance of the natural sciences vis-à-vis the human sciences has been described as extreme, also compared to other countries (Svensson 1987; Widmalm 1999). Also, when it comes to Denmark natural science seems to have played a more prominent role in national narratives than in Norway for instance. In Denmark the period between 1955 and 1960 is described as the years of “the great expansion” for the natural sciences. This was an era when the social democratic government initiated a radical increase in support of natural science – which was seen as a strategy to become a real and modern industrial nation (Hvidtfelt Nielsen and Nielsen 2006). Even earlier the natural sciences seem to have enjoyed a more prominent position (Kjærgaard 2006). These examples serve to highlight difficulties that arise when it comes to supporting or substantiating claims for a distinct and shared Scandinavian order. It seems appropriate therefore to conceive of a collective such as Scandinavia as a flexible entity that entails multiple forms of entanglement.

It seems appropriate nevertheless to develop the picture portrayed above with a few considerations on what our focus on this region could add to historiography. To the outside world Scandinavia presents itself as a rather unique array of variation within a common framework. There is a closeness between Denmark, Norway, and Sweden that entails more than Scandinavian design or being the assumed home of the modern welfare state.

More specifically to the history of sciences there is e.g., a tradition of creating uniform and publicly accessible databases. These have been growing from early modern parish registers through demographic databases to the wealth of information that is attached to everybody’s personal identification number in the twentieth century. It

is not by coincidence that Scandinavia as a region can be credited with creating demography as a science (Imhof 1994). The impact of such traditions on epidemiology is subject to Susanne Bauer's contribution. Linked to these usually politically rather uncontroversial and often publicly accessible registers, there is a noticeable tradition and high acceptance of centralized and interventionist public health. This has resulted, for instance, in vaccination rates that are rather high when put in international comparison (Løvoll and Sandbu 2002)¹ or in the relatively successful handling of antibiotics resistance. As Anne Kveim Lie's analysis suggests, this relied just as much on a political culture of restraint and of trust in authorities as on medical microbiology (Jensen et al. 2010; Goossens et al. 2005). Hence, science–society relations seem to resemble state–society relations in the sense of both being based on mutual trust rather than distrust. This trust would entail the authorities and the employed technological solutions alike. Such spirit has even been exported. Right after World War Two it was the Danish Red Cross that initiated worldwide campaigns for the introduction of the BCG vaccine (Brimnes 2007). In other instances such as in microbiological diagnostics such export failed for lack of political structures that would support it (Gradmann 2013).

Enacting a Region

However, while these examples point to a lot of common features there is still no unity. It seems more that developments in one country would be driven forward with an eager eye on the two neighbors. Historical traditions such as Lutheran Protestantism would in this case not only account for common grounds but similarly allow for variations within that frame. While both Denmark and Sweden have been regional imperial powers for parts of their history, Norway since the late Middle Ages came to be part of those empires out of which it only attained independence over the course of the long nineteenth century. In enabling such independence, science and the strategy to establish a university in the capital of the emerging Norwegian nation state played a significant role (Collett 2011).

Moreover, concerns with Scandinavian trajectories and science–society relations are fruitful only insofar as science as a transnational dimension is taken into account. Exploring polar science or bacteriology at the turn of the twentieth century for instance, makes little sense if only grasped within a national or regional context. The essay by Druglitrø and Kirk demonstrates the ways in which the animal model in science became an integral part not only of a Scandinavian way of life, but a transnational way of life – intended to ensure a reliable science as well as animal welfare. All the same, at least in the Scandinavian setting, it was closely linked to the welfare–state at large. The paper by Druglitrø and Kirk links directly with another point that we have made above:

¹ Cf. http://apps.who.int/immunization_monitoring/globalsummary/countries?countrycriteria (last accessed February 18, 2014).

Scandinavia, or other “regions” for that matter, are not to be taken for granted or to be treated as a fixed context in which scientific practices take part. Rather, science, technology, and medicine take part in producing such collectives in the first place. This issue points to a feature that we wish to emphasize, namely the means, materials, and technologies by which scientific disciplines are built, transnational scientific practices are made, and collectives – such as “Scandinavia” – have come into being.

Sven Widmalm’s contribution develops this further, adopting a meta-perspective. His analysis of the science–industry nexus includes the ways in which this nexus is experienced, reflected upon, and narrated by the actors involved. What his paper demonstrates is the flexibility of this science–state nexus, which allows actors to establish a series of different models of connecting industries and academic institutions. Widmalm vividly demonstrates how the actors engage science–society relations in their own writings. His observation points to the importance in a more general sense of writing and narrating practices in the sciences. This is of relevance to the involved actors as well as to us who narrate history. Kristin Asdal in her contribution, underlines the importance of text–books and argues that specific science–society relations, or more precisely medicine–client relations, are enacted in and can be teased out from such text–book practices. Anne Kveim Lie, in her contribution points to the importance of note-taking practices in the making of agreements regarding how to pursue a collaborative, but still tacitly hierarchical, practice in laboratory medicine. Her paper addresses the heterogeneous but nevertheless very concrete social–material collaborative practices that together take part in enacting collectives – and that have taken part in making up Scandinavia as a region. Hence, the making of collectives goes beyond narrating and writing practices and includes inscriptions more broadly, as well as counting and socio–technical and digital infrastructures. The contribution by Susanne Bauer delves into this: What gets written into databases becomes part and parcel of scientific, administrative, and political purposes (Waterton 2010; Bowker 2005). Again, such practices also take part in making up a nation – or a region: Scandinavia. Moreover, a science–state nexus may write itself into such infrastructures. If what we are after is the invisible state, it is precisely such collecting and inscription processes that we need to explore.

Our approach has not been to offer a comprehensive overview let alone a definitive list of characteristics. Rather, we assemble cases and stories that relate to an overriding agenda. Thus we seek to tease out from “within” some of the particularities and exemplarities of the Scandinavian science–society relations. The papers in this issue illustrate how to study science–society relations from the perspective of the history of a more peripheral geographical region, which entails the opportunity to gain insight that cannot easily be attained elsewhere.² We believe that the present essays may offer some insight beyond a dominant trend in the historiography of science, technology,

² A comparable point has been made by Siegmund-Schultze and Sørensen 2006.

and medicine, namely to overemphasize the developments that have taken place in large countries or central regions.

The history of recent large scale technology, for example, has in that sense been Americanized (Krige 2006). Likewise, in the history of nineteenth-century Germany, Prussia is too easily equated with the whole, just as much as the famous Pasteurization of France (Latour [1984] 1988) is easily equated with a Pasteurian “take over” no matter where. Studying the history of science, technology, and medicine from the perspective of regions, however, does more here than broaden perspectives. Much as the recent historiography of colonial science has started to emphasize local trajectories in colonies instead of import of methods and technologies (Sivasundaram 2010), bringing to the fore histories from peripheral European regions should facilitate insight into previously underestimated dynamics. But rather than offer a “region of its own” so to speak, we want to invite our readers to reflect upon the extent to which our narrating of “the Scandinavian way” may bear upon how we grasp science more generally and help us rethink the historiography of science. Very generally put, the historiography of science has tended to downplay applied science for the benefit of basic science (Edgerton 2004). Our argument about the relative weakness of basic natural science, the focus on the science–state nexus in addition to the science–industry nexus, and then finally the emphasis on writing and inscription practices – may all point in the same direction: That we think about science as more entangled with society, economy, mundane practices and of scientific innovations to take place in more applied settings.

References

- Asdal, Kristin. 2004. *Politikkens teknologier. Produksjoner av regjerlig natur* [Technologies of politics: Producing governable nature]. Oslo: Unipub.
- Asdal, Kristin. 2008a. “On Politics and the Little Tools of Democracy: A Down-to-Earth-Approach.” *Distinktion: Scandinavian Journal of Social Theory* 16:11–26.
- Asdal, Kristin. 2008b. “Subjected to Parliament: The Laboratory of Experimental Medicine and the Animal Body.” *Social Studies of Science* 38:899–917.
- Beer, Eileene Harrison. 1975. *Scandinavian Design: Objects of a Life Style*. New York: American-Scandinavian Foundation.
- Bjerknes, Gro, Pelle Ehn, Morten Kyng, and Kristen Nygaard, eds. 1987. *Computers and Democracy: A Scandinavian Challenge*. Aldershot: Avebury.
- Bowker, Geoffrey C. 2005. *Memory Practices in the Sciences*. Cambridge MA: MIT Press.
- Brimnes, Nils. 2007. “Vikings against Tuberculosis: The International Tuberculosis Campaign in India 1948–51.” *Bulletin of the History of Medicine* 81:407–430.
- Byrkjeflot, Haldor. 2001. “The Nordic Model of Democracy and Management.” In *The Democratic Challenge to Capitalism: Management and Democracy in the Nordic Countries*, edited by Halso Byrkjeflot, Sissel Myklebus, Christine Myrvang, and Francis Sejersted, 19–45. Bergen: Fagbokforlaget.
- Byrkjeflot, Haldor, Sissel Myklebus, Christine Myrvang, and Francis Sejersted, eds. 2001. *The Democratic Challenge to Capitalism: Management and Democracy in the Nordic Countries*. Bergen: Fagbokforlaget.
- Christiansen, Niels Finn. 2006. *The Nordic Model of Welfare: A Historical Reappraisal*. Copenhagen: Museum Tusulanum Press.

- Collett, John Peter. 2011. *Universitetet i Oslo 1811–2011*. Vol. 1, *Universitetet i Oslo 1811–1870. Universitetet i nasjonen* [University of Oslo 1811–2011. Vol. 1, The University of Oslo 1811–1870. The University in the Nation]. Oslo: Unipub.
- Edgerton, David. 2004. “‘The Linear Model’ Did not Exist: Reflections on the History and Historiography of Science and Research in Industry in the Twentieth Century.” In *The Science-Industry Nexus: History, Policy, Implications: Nobel Symposium 123*, edited by Karl Grandin, Nina Wormbs and Sven Widmalm, 31–57. Sagamore Beach MA: Science History Publications.
- Ehn, Pelle. 1989. *Work-Oriented Design of Computer Artifacts*. Stockholm: Arbetslivscentrum.
- Fallan, Kjetil. 2012. *Scandinavian Design: Alternative Histories*. London: Berg.
- Foucault, Michel. 1991. “Governmentality.” In *The Foucault Effect: Studies in Governmentality*, edited by Graham Burchell, Colin Gordon, and Peter Miller. Chicago: University of Chicago Press.
- Gaudillière, Jean Paul, and Ilana Löwy, eds. 1998. *The Invisible Industrialist: Manufacturers and the Production of Scientific Knowledge*. Houndsmills: Macmillan.
- Glamбек, Ingeborg. 1997. *Det nordiske i arkitektur og design sett utenfra* [Nordic Architecture and Design Seen from Outside]. København: Arkitektens Forlag.
- Goossens, Herman, Matus Ferech, Robert Vander Stichele, and Monique Elseviers. 2005. “Outpatient Antibiotic Use in Europe and Association with Resistance: A Cross-National Database Study.” *Lancet* 365(9459):579–587.
- Gradmann, Christoph. 2013. “Sensitive Matters: The World Health Organization and Antibiotic Resistance Testing, 1945–1975.” *Social History of Medicine* 26:555–574.
- Hamran, Olav. 2010. *Riktig medisin? En historie om apotekvesenet* [The Right Medicine? A Story on the Apothecary System]. Oslo: Pax.
- Hestmark, Geir. 1999. *Vitenskap og nasjon: Waldemar Christopher Brøgger 1851–1905* [Science and the Nation: Waldemar Christopher Brøgger]. Oslo: Aschehoug.
- Hvidtfelt Nielsen, Kristian, and Henry Nielsen, eds. 2006. *Viden uden grænser: 1920–1970* [Knowledge without Borders]. Vol. B. 4, *Dansk naturvidenskabs historie* [The History of Danish Natural Science]. Århus: Aarhus universitetsforlag.
- Inhof, Arthur E. 1994. *Lebenserwartungen in Deutschland, Norwegen und Schweden im 19. und 20. Jahrhundert*. Berlin: Akademie Verlag.
- Jasanoff, Sheila, ed. 2004. *States of Knowledge: The Co-production of Science and Social Order*. London: Routledge.
- Jensen, Siri, Morten Lindbæk, Christoph Gradmann, and Anne Kveim Lie. 2010. “Erindringer Om Antibiotikaresistensens Historie” [Memories on the History of Antibiotic Resistance]. *Tidsskrift for Den norske legeforening* [Journal of the Norwegian Medical Association] 24(130):2494–2498.
- Kjærgaard, Peter C., ed. 2006. *Lys over landet: 1850–1920, Dansk naturvidenskabs historie* [Light throughout the Country: 1850–1920. The History of Danish Natural Science]. Århus: Aarhus universitetsforlag.
- Krige, John. 2006. *American Hegemony and the Postwar Reconstruction of Science in Europe*. Cambridge MA: MIT Press.
- Latour, Bruno. [1984] 1988. *The Pasteurization of France*. Cambridge MA: Harvard University Press.
- Løvoll, Øistein, and Synne Sandbu. 2002. “Measles and Measles Immunisation in Norway: Historical Review and Present Situation.” *Eurosurveillance* (12), <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2099> (last accessed December 7, 2013).
- Moene, Karl, and Michael Wallerstein. 2006. “Social Democracy as a Development Strategy.” In *Globalization and Egalitarian Redistribution*, edited by Michael Wallerstein, Pranab K. Bardhan, and Samuel Bowles, 148–168. New York: Russell Sage Foundation.
- Myklebust, Sissel, ed. 1997. *Technology and Democracy: Obstacles to Democratization - Productivism and Technocracy*, vol. 28 of *TMV Skrifterserie. Centre for Technology and Culture*. Oslo: University of Oslo.
- Rheinberger, Hans-Jörg. 2004. “Physics and Chemistry of Life, Commentary.” In *The Science-Industry Nexus: History, Policy, Implications: Nobel Symposium 123*, edited by Karl Grandin, Nina Wormbs, and Sven Widmalm, 221–225. Sagamore Beach MA: Science History Publications.

- Sejersted, Francis. [1964] 1993. *Demokratisk kapitalisme* [Democratic Capitalism]. Oslo: Universitetsforlaget.
- Sejersted, Francis. 2011. *The Age of Social Democracy: Norway and Sweden in the Twentieth Century*. Princeton NJ: Princeton University Press.
- Shapin, Steven, and Simon Schaffer. 1985. *Leviathan and the Air-pump: Hobbes, Boyle and the Experimental Life*. Princeton NJ: Princeton University Press.
- Siegmund-Schultze, Reinhard, and Henrik Kragh Sørensen, eds. 2006. *Perspectives on Scandinavian Science in the Early Twentieth Century*. Oslo: Novus Forlag.
- Sivasundaram, Sujit. 2010. "Sciences and the Global: On Methods, Questions, and Theory." *Isis* 101:146–158.
- Sogner, Knut. 1997. "The Double Meaning of Vitamins." *Scandinavian Journal of History* 22(3):187–198.
- Suchman, Lucy. 1988. "Designing with the User, a Review of Computers and Democracy: A Scandinavian Challenge." *ACM Transactions on Office Information Systems* 6(2).
- Svensson, Lennart G. 1987. *Higher Education and the State in Swedish History*. Stockholm: Almqvist & Wiksell International.
- Walsh, Vivien. 2004. "Paradigms in the Evolution of Life Sciences Research, and the Changing Structure of the Innovative Organization." In *The Science-Industry Nexus: History, Policy, Implications: Nobel Symposium 123*, edited by Karl Grandin, Nina Wormbs, and Sven Widmalm, 189–219. Sagamore Beach MA: Science History Publications.
- Waterton, Claire. 2010. "Experimenting with the Archive: STS-ers As Analysts and Co-constructors of Databases and Other Archival Forms." *Science, Technology & Human Values* 35:645–676.
- Widmalm, Sven. 1999. *Vetenskapsbärarna: naturvetenskapen i det svenska samhället, 1880–1950* [Champions of Science: Natural Science and Swedish Society, 1880–1950]. Hedemora: Gidlund.
- Witoszek, Nina. 1998. *Norske naturmytologier: fra Edda til økofilosofi* [Norwegian Mythologies of Nature: From the Edda to Eco-Philosophy]. Oslo: Pax.