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Science in Transit: Enlightenment Research Policy and Astronomy in Sweden

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Abstract. Swedish participation in the international efforts to measure the transits of Venus in the 1760s was impressive considering the size and the relative youth of the mathematical and astronomical community in the country. In this paper it is argued that the relative success of the Swedish contribution may be seen as the result of an early-modern form of research policy. This policy was promoted by the progressive so-called Hat Party that came into power in the late 1730s, an event that coincided with the creation of the Swedish Royal Academy of Sciences in Stockholm, soon to emerge as an organizational hub of astronomical research in Sweden and to some extent also on the European level. The close connection between the scientific and political elites in Enlightenment Sweden made possible the creation and international integration of a Swedish research community, not least in astronomy under the leadership of the Academy's perpetual secretary and astronomer Pehr Wargentin. The fact that these elites shared a common fate is also illustrated by their simultaneous decline from around 1770.

1. Introduction

Research policy is something we associate with the Second World War and the post-war era. The war brought with it large-scale government investments in research and development all over the western world, and the eastern block and the trend continued during the Cold War. This was true also in a small and neutral country like Sweden, where a system of government-funded research councils was created during the war and then expanded (Pettersson 2012). In the emerging policy community utilitarian and traditional academic values merged in what has been called a social contract for science (Guston & Keniston 1994). As the cost of research escalated, the contract was however renegotiated. More emphasis was placed on innovation, and control systems were implemented in order to steer research towards politically defined goals. As research policy took a technocratic and economistic turn, the period of relative academic autonomy that lasted from the early 1800s to the late 1900s began to look like a historical parenthesis (Rider et al. 2013).

Superficially at least it seems as if a historical circle has been closed. In certain respects current research policy is very similar to early modern research policy from around 250 years ago. This is the framework for my discussion of eighteenth-century astronomy and the transits of Venus in Sweden: the development of early modern astronomy, and the impressive manifestation of organizational and technical skill displayed by Swedish astronomers in connection with the transits in 1761 and 1769, must be understood within a policy framework that had a family likeness to that which we see today.

As Dorinda Outram has pointed out, the Enlightenment has constantly been used during the twentieth century as a point of reference for modernity. It has been seen as a cradle of democracy, secularization, tolerance and of course science (Outram

1999). By suggesting similarities between current and Enlightenment research policy I want to draw attention to the fact that policy has been with modern science since its origin (and that it should therefore not be seen as a twentieth-century invention). I also want to suggest that it is valuable in itself to think about the past using contemporary categories, as long as one avoids the many errors of presentism (judging the past by the standards of the present). By using the Enlightenment as a distant mirror, like Barbara Tuchman (1978) once put it, we are able to distance ourselves from the confusing present and get some sort of perspective on current affairs. Indeed, the fear of presentism should not stop us from applying contemporary concepts when discussing historic phenomena if they can help us to construct bigger pictures of important developments than those offered by micro-historical case studies.

2. The co-founding of science and research policy

An Enlightenment Research Policy was created in Sweden in 1739 through two simultaneous events: the founding of the Royal Swedish Academy of Sciences, and the launching of a party-political parliamentary system with the ascent to power of the so-called Hat Party that had arisen in binary opposition to the old political establishment that was now being identified as the Caps (as in "night caps").

The events surrounding the creation of the Academy were described in 1761 by Carl Linnaeus who drew a useful picture of the political and scientific interests and alliances that lay behind these momentous developments. The description is from a letter to the astronomer Pehr Wargentin whom we will soon encounter again as the main organizational force in Swedish astronomy during the transits of Venus:

> As soon as I returned from my travels in 1738, I was befriended by Herr Captain Triewald who was a really nice man, full of concern for the general good, acquainted with most people, well spoken [...], always promoting the interests of the Fatherland [...].
>
> During our acquaintance we spoke daily about how a science society should be founded in Stockholm, that wrote only about economic and practical matters, and that in the mother tongue [. . .]. He thought I could in particular provide new knowledge in natural history and that we could in each issue [of the Academy's envisaged Transactions] publish something along those lines. He thought he himself could produce mechanical products, and if we engaged a few good country gentlemen everything would fall into place. [—]
>
> Every time we were together, or met in town, we spoke about this project until I finally told him one should commence and talk less. After a few days he told me he had spoken to Baron von Höpken whom I did not know [...]; but Triewald told me about his great talent and how he was the best person to write and regulate statutes and formalities for the society, which was very important (Linné 1908 pp. 243–44).[1]

Linnaeus related how he and Triewald gathered a small group of founding members – the merchant Alströmer and a few landed gentlemen interested in agricultural

[1]Translated from the Swedish. All translations in this article are by the author.

development – and began regular meetings, the most important object of which was to suggest other fellows for the Academy that they now had founded. According to Linnaeus

> We made a holy promise never to accept any new members on account of friendship or any other reason than that we were convinced that they could provide useful discoveries for the transactions

(Linné 1908, p. 244). The new members were to sign a paper promising to do their best as "honest Swedish men". One person, however, refused to sign this form because he thought the expression honest Swedish men "meant the Hat Party" (Linné 1908, p. 245).

This description captures a number of important features of Enlightenment research policy in Sweden. Most importantly, that the Academy was founded in order to promote *useful* knowledge. Like today, economic utility was central for the ideology of science during much of the eighteenth century, and of course not only in Sweden. In Sweden we tend to describe this period as utilitarian, meaning that focus was always on economic utility.

The idea that science should be economically useful was connected with religious ideas – the usual notions that God has created everything for the use of mankind etc. – as well as economic-political ideology (Frängsmyr 1977). The latter was mercantilistic. The nation was seen as a company and the aim of scientific research and technological development was to help exploit and refine natural resources. The citizens were seen, more or less, as a proletariat that should work at maximum efficiency on as small a salary as possible (Kaiserfeld 2009, Liedman 1986).

The founding members of the Academy represented such an ideology and also the kind of mixture of skills that was needed in order to help realize it. The merchant Alströmer, the engineer Triewald, the physician and naturalist Linnaeus, aristocratic progressive land owners, and not least the young star of the mercantilistic Hat Party Anders Johan von Höpken. All but one supported the Hats and it is not surprising that the Academy as such was seen as a Hat project (Hildebrand 1939, ch. 5–6).

Today policy wonks speak of research meaning innovation and of academic freedom meaning New Public Management auditing. Enlightenment research policy was likewise characterized by a peculiar discourse. In Sweden the term "science" – *wettenskap* – did not differentiate between knowledge production (natural philosophy) and technological development (Hildebrand 1939, pp. 372–373); *wettenskap* was described, in the same breath, as a godly pursuit, a patriotic duty, and an economic necessity (Pihlaja 2012). Such discourses integrate ideals of research with political and economic ambition and forges bonds between scientific practitioners and political and economic elites.

The founders of the Academy attempted to distance themselves from the various interests they represented by emphasizing that only technical qualifications would entitle to membership in the Academy. They somewhat spoiled this impression by then taking turns in nominating their friends. But the principle was of course fundamental in early modern science: credibility depended on the ability to uphold at least the appearance of impartiality; the ideal was meritocratic (Shapin & Schaffer 1985). We could also describe it as proto-professional (Shapin 1994, pp. 409–417).

It would as a matter of fact seem, for a while, that academic science in Enlightenment Sweden was heading towards professionalization some hundred years before the event. Under the guidance of the Hat Party and early parliamentarism a number of institutions were created or modified with the help of scientific expertise of which the Academy functioned as a center, or a kind of umbrella organization (Widmalm

1990, ch. 5). Health care was extended through the system of provincial doctors guided by the *Collegium Medicum*, for many years headed by Linnaeus' close friend Abraham Bäck. Scientifically-founded map making and navigation were improved with the help of astronomical expertise fostered at the new observatories in Uppsala and Stockholm. By and by such expertise was introduced in the national land survey and in the admiralty's chart making. An office for population statistics – possibly the first in the world – was founded in the 1740s under the auspices of the Academy (Johannisson 1988). Chemistry flourished in the government Mining Office that benefited from collaboration with academic chemists (Fors 2003). And of course there was Linnaeus, traversing the land commissioned by Parliament to map exploitable natural resources (Koerner 1999).

By mid-century the Academy functioned as an interface between various semi-professional scientific groups and a science-friendly government. There, poor astronomers like Anders Celsius and Pehr Wargentin (see Fig. 1) mingled with ministers, aristocrats and super rich merchants; the scientists were indeed seen as servants of the state, but government as well as individual patrons could also support endeavors that were only indirectly useful. Blissful harmony seemed to characterize research policy in this period when science surfed on a wave of promises that one hoped would soon be realized through the patronage of an enlightened government.

Figure 1. Pehr Wilhelm Wargentin, director of the Academy Observatory in Stockholm at the time of the Venus transits. Courtesy of the Academy of Sciences in Stockholm.

No wonder scientists thought that they were on the verge of establishing a secure professional status, and this was true not least of the astronomers. Ambitions for

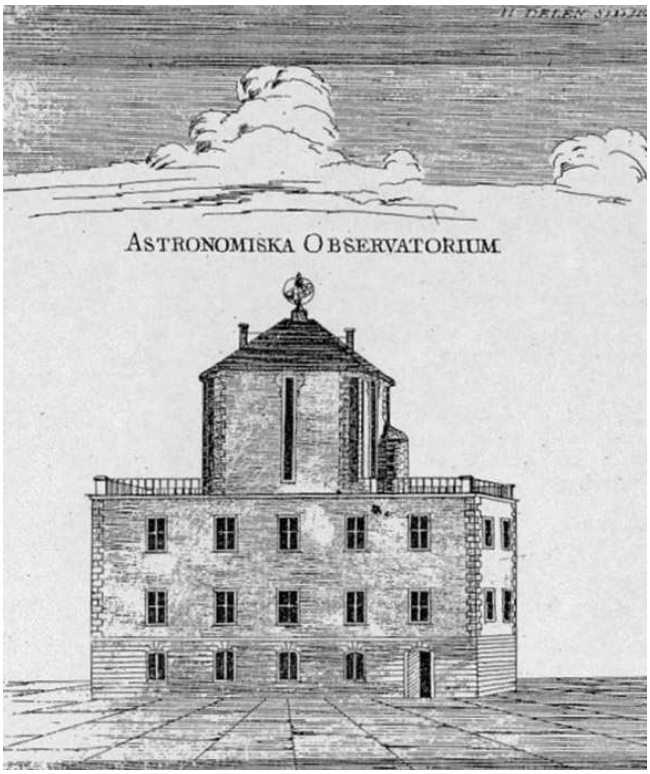

Figure 2. The Uppsala University Observatory. Contemporary engraving, c. 1769. Source: Wikimedia Commons.

Celsius' University Observatory in Uppsala, founded in 1741 (see Fig. 2.), were high. Not only did Celsius promise that observatory staff would produce useful knowledge in areas such as navigation, cartography, ecclesiastical time reckoning, and meteorology. He also devised a research programme that would make Uppsala a central node in the exchange of scientific data between European astronomers, for example mapping the stars of the Zodiac. As Celsius died already in 1744, he was succeeded by a mathematician whereas the research programme was inherited by the incumbent of the newly created position of Astronomer Royal. But this person was not long-lived either and from around 1750 astronomy at Uppsala was in fact dominated by mathematically oriented scientists like Fredrik Mallet and Daniel Melanderhielm (Widmalm 2012).

The national center of practical astronomy moved to Stockholm where the first two perpetual secretaries were both astronomers and where a new Academy Observatory, much grander than the Uppsala institution, opened in 1753 (Fig. 3). It is worth lingering a little on the founding of this observatory as it illustrates the close relationship that had developed between the political and scientific elites in the Hat Party and the Academy, both now nearing zenith of their power.

The inauguration of the observatory in September 1753 took place in the presence of the Royal couple and a host of other dignitaries, and the inauguration speech was delivered by von Höpken, who was by now considered the true founding father of the Academy and who had the year before risen to the highest political office in the land, President of the Chancellery, approximately Prime Minister. Hence, though he was not a scientist himself, he united the highest scientific and political power in one person.

Von Höpken was known as a great orator and on this occasion he proved his worth in this respect, painting a vivid image of scientific developments since Antiquity,

Figure 3. The Stockholm Academy Observatory. Contemporary drawing from the 18th century. Courtesy of the Academy of Sciences in Stockholm.

emphasizing in typical Enlightenment manner that the present was an improvement on the past in most respects and that the future promised even greater things. In the modern period, said von Höpken, "Philosophy discarded semantic quarrels and dressed itself in mathematical garb" (Höpken 1890, p. 181). Mathematical sciences represented not only a useful rationalism but ethical values, as it constituted a disciplining of the mind (Höpken 1890, p. 177). The successes during what we call the scientific revolution, Höpken attributed to a growing appreciation for science among political and military leaders as well as the growing number of scientific practitioners. As for Sweden great things had been accomplished in the past few decades. Von Höpken stressed that all branches of science in Sweden were now – unlike during the so-called Great Power era (1611–1718) – carried out by the Swedes themselves and not by scholars imported from abroad. Addressing himself to the members of the Academy he told them to whom they should be grateful:

> Who has during a shorter space of time enjoyed more grace from the authorities, more favors from Parliament, more consideration from the public, than you have? What have you requested that you have not also received? And how often have you not been granted such a wealth of favors that you have not even dared to wish for them to be so great, and much less demand them (Höpken 1890, pp. 183–4)

And so on. The message was deafeningly clear: the sciences flourished under the Hats, because of the Hats. Von Höpken then pointed out that the observatory was indeed a splendid example of how privileged the sciences were during the present regime. As the scientists had gone about their business without a care for anything but their "calling", he said, a number of benefactors had worked hard in order to realize the project, though modesty and delicacy forbade him to mention their names: benefactors should not be publically praised, they should be honored only through ardent scientific work.

Luckily for us Wargentin – now secretary as well as astronomer at the Academy – printed an appendix to this speech where all the benefactors that helped realize the observatory project are named! Gratefulness demanded, he wrote, that their names were recorded for posterity. The benefactors' contribution was invaluable because astronomy was the most useful and hence the most important science. Without observatories, astronomy would have to be founded on "guesswork" and "a country's felicity, that is founded on economy and commerce, should not be imperiled by guesswork" ([Wargentin] 1753).

So who were these benefactors? First Wargentin's predecessor as secretary of the Academy, Pehr Elvius, an astronomer who like his cousin Anders Celsius had passed away in early middle-age. Then the Baron and architect Carl Hårleman who drew up the plans for the observatory, the Count and leading Hat politician Carl Gustaf Tessin who saw to it that the Stockholm magistrate supported the project, the rich merchant Claes Grill who provided interest-free loans to the Academy. They had one thing in common: they were all prominent representatives of the Hat Party. The Stockholm observatory, where Wargentin would soon move in with an expanding family, was indeed a splendid symbol of the intimate not to say symbiotic relationship between political, economic, and scientific power in Enlightenment Sweden.

3. The transits

In the early 1750s Swedish astronomers participated in an effort organized by the French, in particular Nicolas-Louis de Lacaille, to estimate the parallax of the Sun from measurements of the Moon, Mars and Venus carried out at the Cape of Good Hope and simultaneously in Europe. Observations from Sweden were deemed especially important as they could be made on the same meridian as the Cape. Joseph-Nicolas Delisle, who had been on friendly terms with several Swedish astronomers for a long time, suggested that he should come to Sweden and make the measurements, just like Pierre-Louis Moreau de Maupertuis had done in the 1730s, when an arc of the meridian was measured in northern Sweden (Widmalm 1992).

Wargentin, who was corresponding with Delisle and who had just become secretary of the Academy, however took this opportunity to make a display of national scientific strength by organizing the Swedish measurements himself, in a sense a kind of dress rehearsal for the coming transits of Venus. This would not have been possible if government had not financed the purchase of new instruments, which it gladly did. Observations were carried out during all of 1751 on five different locations by astronomers at Lund, Uppsala, and Åbo/Turku, and by Wargentin in Stockholm as well as by the amateur astronomer Anders Hellant in the far north (Lindroth 1967, pp. 393–399).

Though nothing much of scientific value transpired from these measurements, they served important social goals for the Swedes. The good relations between the scientific community and the Hat government were cemented through this display of scientific magnanimity on part of the Government and of organizational and technical prowess on part of the astronomers. Similarly the Swedes displayed a willingness and a competence to carry out international collaborative work, in effect proving that they had reached a level of maturity where their natural scientific resources could no longer be colonized by the scientific leaders in Paris. As we have seen, the importance of both these moves towards political and international scientific integration were duly noted and praised by von Höpken in his observatory speech.

The Swedish contribution to the much larger international efforts to estimate the solar parallax from measurements of the transits of Venus strengthened this pattern

(Aspaas 2012, pp. 219–227; Lindroth 1967, pp. 399–411). These efforts were, of course, directed towards a worthy and important scientific goal. But they must equally be understood in a policy context, as expressions of a politicized view of science where scientific and political power essentially merged.

This symbiosis was given a powerful symbolic expression during the first transit in June 1761 when observations at the Stockholm observatory were carried out in the presence of leading government representatives as well as the Queen, and the fifteen-year old Crown Prince Gustav who would seize absolute power in a coup eleven years later. His mother had tried to do the same thing five years before the transit event, when the Hat regime ruled almost dictatorially. On that occasion the coup failed and eight conspirators were beheaded after having undergone torture. Prince Gustav, who was to be indoctrinated against all ideas of absolutism, was then given a new tutor, namely the Uppsala mathematician and physicist Samuel Klingenstierna.

General instructions for the education of the prince were written by von Höpken, and they were of a republican and enlightened tendency. The prince should be taught that he was no different from his subjects; luxury should be abolished at court; the prince should travel the land in order to learn about the living conditions of even his poorest subjects so that he would come to realize that "royal personages are not a better kind than other human beings" (Skuncke 1993, p. 183). Unsurprisingly this document was hailed by the French Encyclopaedists. The prince's governor, a leading Hat politician, wrote instructions for Klingenstierna that emphasized the importance of the prince's education in mathematics and physics. In particular mathematics was said to be morally important as it was the foundation for right thinking in a general sense – the same idea that von Höpken had expressed in his observatory speech (Scheffer 1757). Science became part of the moral education of a prince who should be taught republican values. Enlightened science policy therefore ran deep also in the harsh power politics of the period.

Then came the first transit of Venus, and I quote the following from Wargentin's observatory journal:

> On this day, so longed for by astronomers, namely June 6, I successfully observed the rare phenomenon of Venus in the Sun. Present were Her Majesty the Queen, the Crown Prince, a large number of ministers and foreign ambassadors and perhaps a too large group of spectators of both sexes and from all estates. The sky was almost as advantageous as one could wish. [–] The famous mathematician Herr Klingenstierna aided me observing and had his eyes tensely directed towards the Sun through his 10-foot Dollond tube [...]. Besides Herr Wilcke, with a 2-foot reflecting telescope, Herr C. Lehnberg with a 9-foot tube and high-born Baron von Seth with a very good 5-foot tube observed. But they, who were standing in another part of the room, could, because of the noise from the spectators, only with difficulty hear the voice of Herr doctor Gadolin who called out minutes and seconds after the time piece. (Nordenmark 1939, p. 177)

Wargentin had put an advert in one of the Stockholm papers announcing the event so he had only himself to blame that it became well attended. At the same time there is certainly something of the spirit of the Hat's educational programme being realized through this event, that gathered leading scientists, politicians, aristocracy and royalty as well as a crowd of citizens of both sexes and from all estates. It should certainly be seen as a manifestation of political unity – of government and

court, of political and scientific elites – being put on display for a small but noisy selection of representatives of the people.

A report was quickly published by Wargentin in the *Transactions* (*Handlingar*) of the Academy of Sciences, describing observations of the transit in Uppsala and Stockholm as well as on seven other locations. Wargentin described the event as one where Swedish astronomy would "fulfill its duty" – that is its duty to the international community of astronomy (Wargentin 1761, p. 143). Here interesting effects like the black drop were discussed and spiced with speculations regarding the possibility that Venus has an atmosphere. The main purpose of the report was to display the massive scientific effort by the Swedes; the presence of the royals at the observatory was not even mentioned. The political importance of the event was hinted at through the mentioning of the participation of one important Hat official among the observers.

Apparently the government did not finance observation work in 1761. Only one of the astronomers, Anders Planman, actually traveled a lengthy distance in order to carry them out, the others stayed put and did not need travel money. Instruments were presumably at hand from the parallax work ten years earlier. In 1769 however government support was again called for.

This time observations from the far north were considered especially important for reasons of visibility, and the Academy decided to send the astronomer and mathematician Fredrik Mallet from Uppsala to Pello in the Tornedal Valley, and to do other measurements up north as well. Government was approached and immediately granted a substantial sum of money. The Admiralty sponsored Mallet's work and in return the astronomer was to make observations that were of use for ongoing work on sea charts (Nordenmark 1946, pp. 69–79).

Mallet, who had the mindset of a misanthropic Enlightenment *philosophe*, was eaten alive by mosquitoes and complained bitterly about the lack of female company during his year-and-a-half-long expedition. A further aggravation was that he frequently had to associate with Caps, that is political opponents of the Hats, when socializing with the locals in the horrid northern towns he passed through in the course of the expedition. Judging from letters, his mind during the expedition was constantly occupied with thoughts about politics, economy, sex, and science.

Eventually the expedition was a failure, as Venus was hidden by clouds. "I eat my heart out every time I think about the horrible night that I experienced in Pello between June 3 and 4", Mallet wrote to a friend, asking: "Is it wrong to be a little crazy in one's zeal for one's science" (Heyman 1938, p. 284). Mallet apparently thought so and decided to give up astronomy altogether and instead take up a position as principal at a school in Uppsala: "the good salary and the wicked Venus being my foremost incentives" (Heyman 1938, p. 285). He calculated that the salary for the school job would be three times higher than his salary as astronomer at the Uppsala observatory. Furthermore he would be his own boss at the school, which he clearly was not at the observatory, where the professor of astronomy had higher rank as well as salary.

This was not a complaint that reflected on his personal relationship with the professor of astronomy, Daniel Melanderhielm, who was also participating in the collective effort to observe Venus and analyze data and who, like Mallet, was more of a mathematician than a practical astronomer. The two were close friends and Melanderhielm actually saw to it, using political influence, that Mallet got a professor's salary. So he decided to stay on at the university, eventually becoming professor of mathematics, but never ceasing to complain.

4. A distant mirror

I have talked about research policy in Enlightenment Sweden as being founded on a harmonious relationship between political and scientific elites that was reflected in a mutual determination to develop utilitarian science and in a more general commitment to rationalistic ideals. Astronomy in this period has been described as a success story with two new observatories being built, with successful participation in international project like the transit-of-Venus observations, and with a broader international integration through extensive correspondence, international publication and general scientific prominence. Much of the latter had to do with Wargentin. Pehr Wargentin was an assiduous correspondent with a wide national and international network where he exercised his organizational skill and diplomatic genius concerning a wide spectrum of scientific issues, not least his own specialty, to collect and systematize observations regarding the moons of Jupiter. He was the only Swede to appear in Jean-Baptiste-Joseph Delambre's authoritative History of eighteenth-century astronomy from 1827, a measure of his networking capabilities as much as his scientific importance (Delambre 1827, pp. 543–547).

Wargentin was the foremost astronomical practitioner in Sweden in the generation after Celsius but there were others that were competent enough and who loyally heeded Wargentin's call when he asked them to participate in international collaborations. Virtually all of them helped make Swedish participation in the Venus transit observation project a relative success: Nils Schenmark in Lund; Fredrik Mallet, Mårten Strömer, Samuel Klingenstierna, and Daniel Melanderhielm in Uppsala; Anders Planman in Åbo (Turku). As we have seen, the public show staged at the observatory in Stockholm in connection with the 1761 transit may be seen as a symbolic display of concord between scientific and political elites and a promise of further political support for scientific expansion by the Hat establishment.

Academic science was unusually strong in mid eighteenth-century Sweden. Unlike in countries where the scientific revolution had come earlier, professors constituted the scientific elite at the Stockholm academy. Hence for a while it seemed as if science in Sweden was heading towards professionalization – in the sense we associate with the German research university – already by 1750. Scientific institutions were being built, though on a smaller scale than in the following century, and the Academy constituted a dynamic link between the progressive fraction of the professoriate and the urban political and economic elites of the capital. The Hat government even went so far as to suggest, in 1750, a complete reorganization of the university that would have transformed it into a kind of polytechnic, and they imagined that advanced scientific development could safely be carried out under the auspices of the Stockholm Academy (Segerstedt 1971).

But already by 1761 the power of the Hats had been weakened and during the 1760s it would diminish further; academic science had likewise begun loosing momentum by 1770 (Johannisson 1980). As a matter of fact the academic job market was never particularly secure and scientific specialists tended to leave the university if given a chance. Mårten Strömer, who succeeded Celsius, left for a navigation school; Klingenstierna as well as another Uppsala scientist left for the court in the mid-1750s; Lexell got a position in St Petersburg; Melanderhielm took on a commission to write text books for the military; Wargentin and Mallet married money; a few others were privately wealthy; a couple especially successful professors – Linnaeus and the chemist Torbern Bergman – were enticed to stay on by being offered extra-high salary. When Wargentin's wife died in 1769 after a miscarriage her fortune was gone and Wargentin actually had to borrow money from the Academy in

order to pay burial costs. The Academy thereafter raised his salary; he was the one scientist they could not afford to loose (Widmalm 1990, ch. 12).

Enlightenment research policy was co-produced as well as co-destroyed with the Hat regime and with the Swedish parliamentary system, that was overthrown by the autocratic Gustav III in 1772. Mallet wrote to Wargentin in 1781 that they had both consumed all of the money they had gotten through marriage and that his only hope now was to die: "How can one believe, that ruin and despair afflict such valuable and arduous sciences?" (Widmalm 1990, p. 175). A few years earlier Melanderhielm wrote the following to a friend about the awful state of mathematical science in Sweden (Widmalm 1990, p. 175):

> I have now worked 40 years on this science; for this I have been honored abroad whereas for all my work on this science my salary does not even pay for clothes and daily bread. If I hadn't had some money of my own I had already been a great wretch, living in debt and poverty like most of my friends here. [—] I have during my years of service here in Uppsala brought forth and created more mathematicians than have been produced since the foundation of the academy (i.e., the Uppsala University). Some of these are still, at an advanced age, floating like water around rocks. I therefore find that I have not done them a great service by coaxing them [. . .] to stick to this science.

Astronomy and other mathematical sciences were now in decline and would not reach, or rather regain, academic maturity until the second half of the 19th century, with the general adoption of the German university system including academic professionalization and institutionalization. Hence, though an expansive research policy was taking shape and steps towards scientific professionalization were made in Sweden during the Enlightenment, these tendencies would not outlast the political system that sustained them. The successful Swedish contribution to the international efforts to measure the transits of Venus in 1761 and 1769 depended on the ambition and skill of Wargentin and his colleagues as well as on political support. With the political changes around 1770, the Enlightenment social contract for science in Sweden was however broken.

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