

FROM RESEARCH INSTITUTION TO ASTRONOMICAL MUSEUM: A HISTORY OF THE STOCKHOLM OBSERVATORY

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Abstract: The Royal Swedish Academy of Sciences (RSAS) (or Kungliga Vetenskapsakademien [KvA] in Swedish) founded 1739, opened its first permanent building, an astronomical and meteorological observatory, on 20 September 1753. This was situated at Brunkebergsåsen (formerly Observatorie Lunden, or Observatory Hill), on a high terrace in a northern quarter of Stockholm. This historic building is still sometimes called Gamla Observatoriet (the Old Observatory) and now is formally the Observatory Museum. This paper reviews the history of the Observatory from its function as a scientific astronomical institution to its relatively-recent relegation to museum status.

Key Words: national observatories, museums, Sweden, the Royal Swedish Academy of Sciences

1 INTRODUCTION

Even though an astronomical observatory was associated with Sweden's Uppsala University from the 1650s, The Royal Swedish Academy of Sciences (henceforth RSAS)—much like the English Royal Society and the French Academy—sought to establish a national observatory in the nation's capital, Stockholm. Nationalizing and co-ordinating astronomy from the capital was logical, given its important links to other allied scientific pursuits. And so from 1753, Stockholm Observatory became the centre of national and international matters relating to Swedish astronomy, geomagnetism, and geodesy. However, the focus was on research, not education, and the distancing of this facility from the universities was intentional. As such, Sweden soon converged with similar nations sharing, co-developing, and adopting discoveries and observations drawn from these disciplines, garnering the attendant cultural and financial rewards such centres of science permitted—from theoretical studies in astrophysics to practical land and sea navigation for the purposes of trade and defence. But in the course of time, great leaps in scientific knowledge, coupled with increasing population pressure, eventually turned the Observatory into an obsolete historical treasure trove. In this paper we summarise the changing fortunes of Sweden's national Observatory.

2 COMMISSIONING AND CONSTRUCTION

The plan to build a national observatory was first promoted on 4 June 1746 (Alm, 1930: 108),¹ although RSAS Secretary, Pehr Elvius (Figure 1), only formally conveyed the Academy's intentions on 28 June 1746 (RSAS, 1746b). Government support came from the influential Royal diplomat and politician, Anders Johan von Höpken, one of the Observatory's avid supporters for many years, and on 30 June 1746 the RSAS formally thanked the Government for providing a site at Brunkebergsåsen, a high terrace located in a northern quarter of Stockholm (Alm, 1930: 109).²

Elvius was a friend, astronomical observer and correspondent of Uppsala Professor Dr Anders Celsius. Another person who became a central figure in the plan to build the Stockholm Observatory was the architect, RSAS member and Public Works chief, Carl Hårleman (Figure 2). Hårleman's tenure as RSAS President in 1746 was therefore auspicious. Hårleman,

who had executed Royal works elsewhere, relied on the influence of Carl von Linné (Linnaeus) and Elvius to guide him past competitors. In 1748 Hårleman was granted the assignment to build the observatory (Alm, 1930).³



Figure 1: Pehr Elvius (1710–1749) (courtesy: Uppsala Universitet).

The new Stockholm Observatory was hardly Government funded, as operating funds came from sales of the then-important *National Almanac*, which the RSAS had a monopoly on from 17 October 1747 (see RSAS 1747); a trust established by Sebastian Tham in 1727;



Figure 2: Carl Hårleman (1700–1753) (courtesy: Project Runeberg).

an interest-free loan from RSAS member, Claes Grill (a financier and Swedish East India Company's Governor); and probably from other sources. Sadly, Elvius died in September 1749, so he did not live to see the Observatory's inauguration on 20 September 1753. On 2 October 1749 (RSAS, 1749) his place as Secretary of the Academy was taken by Pehr Wargentin (Figure 3).



Figure 3: Pehr Wargentin (1717–1783) (courtesy: Wikimedia Commons).

Working with Stockholm City Engineer, Petter Til- laeus, Hårleman prepared numerous Observatory plans between 1746 and 1748. His sketches (e.g. see Figures 4 and 5) displayed ornate rococo decoration, both on the inside and the outside of the building, oval rotundas and corner niches with a rounded aspect. The Observatory featured a mid-axis and large, lighted rooms (featuring tall observation windows), plus an observation cupola on the roof known as 'Hårleman's Lantern' (see Figure 6).

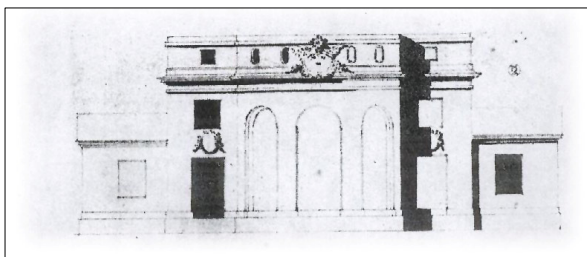


Figure 4: A south façade sketch by Hårleman, probably dating to 1747. Although intended, internal and external rococo embellishments, like escutcheons, were later omitted in favour of a plainer look, possibly as a cost-saving measure (Hårleman Collection, The National Museum, Sweden 6529; after Alm, 1930: 116).

The cornerstone of the Observatory was laid at Brunkebergsåsen on 26 May 1748, but a catastrophic fire on 8 June 1751 in the St. Klara parish (RSAS, 1751) delayed proceedings when it turned to ashes property owned by von Höpken, soon-to-be Observatory instrument-maker Daniel Ekström and others

working to realize the Observatory. Wargentin heroically saved most of the Academy's instruments, and managed to salvage much personal property as well. Another less significant if tragic delay was caused by Hårleman's death on 9 February 1753, seven months prior to the opening of the Observatory. A commemorative coin was subsequently struck bearing his image (see Nordenmark, 1939).

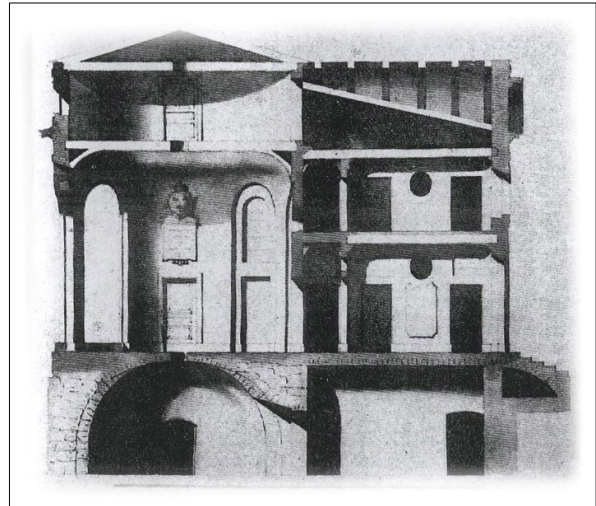


Figure 5: Three-floor cutaway sketch by Hårleman, probably dating to 1746. The main observation room is left, mid-centre. Note the upper floor access to the rooftop 'lantern' observing platform, the ornate escutcheon, and use of the cellar for a workshop, storage and the kitchen (Hårleman Collection, The National Museum, Sweden 6562, after Alm, 1930: 117).

Wargentin strove for inauguration amid all this, and his exchanges with the accommodating von Höpken were recorded on 24 March 1753 (RSAS, 1753a). An official report (dated 31 March 1754) indicated that Wargentin and Ekström had already moved into the Observatory, where Wargentin long would reside with his family—a pattern followed by succeeding Observatory heads. On 15 September 1753 Von Höpken announced that the Observatory would be ready for opening ceremonies in five days time (RSAS, 1753b). The inauguration began on 20 September 1753 at 10 a.m. when King Adolph Fredrik attended the blue ribbon ceremony for one and a half hours. During this interval he toured the rooms, studied the existing instruments (for he reportedly owned many personal ones himself) and met other dignitaries there (the protocol for this date lists the names of those who attended the ceremony; see RSAS, 1753c).

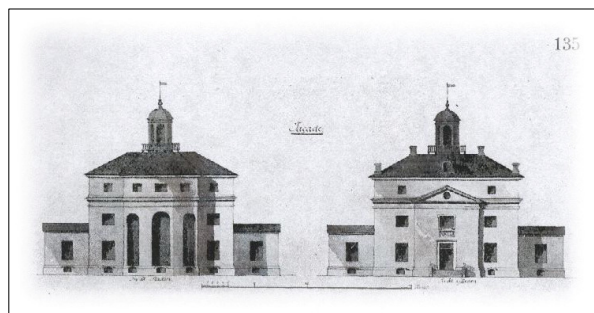


Figure 6: The Stockholm Observatory, showing the south façade (left) and the north façade (right). Note 'Hårleman's lantern' on the rooftop, which was replaced in the 1870s by a protected telescope dome (cf. Figure 13). These property inventory drawings were made by O.S. Tempelman in December 1807 (after Nordenmark, 1939: 135).

3 PER WARGENTIN: AN ENLIGHTENED AGENDA

Pehr Wargentin had been a diligent Celsius student, became a mathematical astronomer, and was a gifted and hard-working Royal bureaucrat. His influence on the Observatory is such that he deserves a separate biographical paper. He apparently was the ‘master hand’ behind the careful arranging and handling of funds to see Elvius’ and the nascent RSAS’ dream of obtaining their first actual scientific property become a reality. His quick election to Elvius’ post gave him a much-needed salary. But his talents had been obvious and were well acknowledged even before Elvius’ death. Wargentin, who previously had successfully championed calendar reform, had the education (a Master’s degree under Celsius) and the demonstrated administrative talent and will to lead. He performed calculations necessary for the vital *National Almanac* in 1750, directly after the death of the Uppsala astronomer, Olof Petrus Hjorter. As RSAS Secretary, Wargentin saw to it that funds increased for the Observatory’s growth, especially after 1754 when he aggressively promoted sales of the *Almanac*—which was not only important for astronomical studies but also for navigation, agriculture, and perhaps the military (RSAS, 1854; Sinnerstad, 1989).⁴



Figure 7: Period instruments at the Stockholm Observatory. On the left is the geographical circle by Daniel Ekström (near his original workroom) and on the right an eighteenth century transit instrument located in the ‘Old Meridian Room’ (photographs by the author).

Wargentin had a large list of international contacts—including Joseph Louis de Lagrange and RSAS foreign member, Pierre Simon Laplace—and he used it. He was well-salaried, but his workload was enormous so he justified it. He wrote the Academy’s protocols; served as his own administrative staff; liaised often and directly with the Royal Government; edited all publications; and continued to work on Hjorter’s *National Almanac*; even producing a quarterly “History of Science” report, which he was ordered to prepare. He groomed, kept in contact with, and paid researchers, such as they were. He mitigated the pique of powerful associate RSAS members; was responsible for all costs, and for the library; performed daily meteorological record-keeping; and contributed numerous scientific publications. He managed all this on top of an astronomical observing schedule, becoming a world authority on Jupiter, and particularly its satellites. He led the Observatory in this manner for more than thirty years, dying while still in office. At the

Observatory, his influence as an astronomer was unmatched until the advent of Hugo Gylden in the 1870s (see Bergström and Elmquist, 2003).

3.1 Early Instrumentation

Before the inauguration of the Observatory, Wargentin was supplied with a small quadrant and two refractors, one five feet long and the other eight and a half feet long, the latter equipped with a micrometer (Nordenmark, 1939). Given a favourable financial report, orders were placed with a live-in instrument-maker, Daniel Ekström, whose workshop was in the Observatory basement. The undeniably talented and hard-working Ekström was originally a blacksmith, but had trained in England to improve his instrument-making skills. Like Härleman, he apparently had been commissioned for Royal works. Ekström was ordered to produce a mobile quadrant of three foot radius, a four foot long transit instrument, an eight foot (radius) mural quadrant, a Machine Parallactique, a large reflector tube (dimensions not given) and a niveau (most likely a ‘niveau à lunette’, a brass surveying level). He succeeded in producing some instruments (e.g. see Figure 7), but died on 30 June 1755, having previously named two potential successors, his apprentices Johan Ahl and Zacharias Steinholz (RSAS, 1755). Of humble origins, Ekström left a family but few funds, so Wargentin kindly arranged a proper burial and a memorial for him, things otherwise denied him due to penury (RSAS, 1755).

The search for research-quality instruments continued. RSAS member Samuel Klingenstierna worked on problems relating to refraction highlighted by Isaac Newton. Klingenstierna and Wargentin wanted an achromatic lens suitable for use in astronomical telescopes. Experiments were performed and in a research paper published in 1754 Klingenstierna showed the problem in a new light, using Euclidean geometry, Snell’s law and the sine theorem of triangles. Another paper by Klingenstierna, written in 1760, outlined the derivation of the equations for spherical and chromatic aberration. John Dollond and his son, well-known London telescope-makers, were in touch with both Leonard Euler and Klingenstierna regarding this, and obtained a copy of Klingenstierna’s 1754 paper. Dollond managed to obtain a concave flint glass by 1757 and a set of positive (convex) crown glasses, and began constructing achromatic telescopes (see King, 1979: 145-148). In 1760 Wargentin ordered a nine-foot refractor from Dollond (see Figure 8), and a 6-inch $f/6$ transit instrument from John Bird. Pendulum clocks were purchased from Peter Ernst of Stockholm, and were regulated by transit observations. In addition, a number of astronomical instruments crafted earlier by Daniel Ekström for King Adolf Fredrik, were donated to the Observatory by King Gustav III in 1772 (Sinnerstad, 1989).

3.2 The Early Research Agenda

Before the Observatory’s founding Wargentin carried out various observations. For example, in 1752 he contributed parallax-related observations to Nicolas Louis de la Caille. After the Observatory opened, he continued to make most of the astronomical observations himself, only obtaining an assistant (and his ultimate successor), Henric Nicander, on 13 November

1776. Wargentin's research programs hardly deviated from those in vogue at the time, prominent among these being exact planetary distances in the Solar System, the Earth's shape and cometary positions. For instance, in 1770 Wargentin reported that since 1742 twenty different comets had been studied. He also studied the important variable star α Ceti (Mira), faithfully recording variations in its magnitude for thirty-two years. Meanwhile, Lagrange and Laplace used Wargentin's Jovian satellite data and some of his other astronomical observations in French publications.

During the eighteenth century, solar parallax measurements loomed paramount, prompting cooperation between various national academies of sciences, including the nascent American Philosophical Society. During the preceding century, Halley indicated that Venus would transit the Sun on 6 June 1761 and on 3 June 1769, and that these rare seven-hour events could be used to determine the Earth-Sun distance (i.e. the Astronomical Unit). Among other nations, France, Russia and Britain (along with its colonies) were all active in reporting observations from different locations (see Woolf, 1959).

In 1761 Wargentin coordinated the Swedish program, assigning Physics Professor, Anders Planmann, the job of studying and recording the 1761 event from Lapland. Meanwhile, Wargentin, Klingenstierna and other observers, along with Prince Gustav, ladies, assorted Royalty and perhaps some diplomats, observed the rare event from the main observation room at the Observatory. Observations began there at 3:21 a.m. on 6 June, and lasted until 9:48 a.m.; fortunately the sky in the climatically-unstable Stockholm area remained clear throughout. The tall, wide windows at the Observatory were opened to accommodate the long telescopes, and a man with a deep strong voice called out the time during the transit. Up in Lapland, Planmann made a simple makeshift tree-bark observatory, and succeeded in obtaining a good suite of measurements. Yet despite all of these successful Swedish observations, there was considerable divergence in the measured contact times—even those obtained by Klingenstierna and his collaborators, observing from the same room—and this was also found to typify the international observations. Consequently, the 1761 transit produced little agreement as to the true value of the solar parallax, and attention quickly switched to the 1769 transit in the hope that it would yield improved results (see Woolf, 1959 for full details). As it happened, the view of the transit from Sweden on 3 June 1769 was poor, and no useful observations were made at the Stockholm Observatory.

Wargentin's diaries show that during his time at the Stockholm Observatory he was able to make astronomical observations on between 50 and 80 days per year. He also reflected on the fact that his European colleagues were able to accomplish more important observational work in the clearer and steadier climes to the south. He pointed out that Sweden was under polar twilight four months of the year, and he stressed the severity of Sweden's winters, despite the long dark nights. To help compensate for these geographical deficiencies, Wargentin used his network of international contacts to keep abreast of, and sometimes to help solve, astronomical problems.

4 GEODESY AND TOPOGRAPHY: 1784-1871

The agenda, budget, and reach of the Stockholm Observatory changed drastically after Wargentin's death in 1783, and a different emphasis was placed on activities for the next ninety years or so. During this period astronomy played a subservient role to geodesy at the Observatory.

We see in Wargentin's successor, Henric Nicander, a general pattern that was to characterise successive Directors of the Stockholm Observatory until 1871 (see Appendix 1). First was humble (or relatively humble) birth. Second, a bent for the pragmatic (Nicander patented practical devices and later championed social reform; Selander pushed currency reform, etc.). Third was aiding the military and university professors in the topographic corps, thereby linking the Observatory with the throne, the military and the universities. There was an overwhelming concern for geographical measurements that would benefit defence and/or trade; sometimes these measurements emphasized nationalistic concerns, which was not unusual at the time (e.g. Cronstrand was associated with the nationalistic Gothic League). Fourth, international astronomical contacts were marginalized, especially in what today would be called astrophysics, while geomagnetic research fared much better. Thus, it was not considered strange that the Observatory's Director should take an active part in map-making and studying Swedish coastal geography during the early to mid-1800s. This occurred while the Swedish observatories at Lund and Uppsala pursued more traditional astronomy-focussed research agendas and could argue for improved instrumentation. But for all this, the breadth of Stockholm Observatory's research widened.



Figure 8: The Dollond refractor located in original main observation room facing the south lawn. Whether or not this is the instrument purchased in 1760 is not clear (photograph by the author).

4.1 A Geodesic Dynasty: Nicander, Svanberg, Cronstrand and Selander

Henric Nicander—Wargentin's Assistant for about a decade—was in place as Director by 21 January 1784 (RSAS, 1784), and continued Wargentin's work, but on a reduced scale. His appointment could have been a compromise whereby Johan Carl Wilcke was made Secretary of the Academy while Nicander received the Observatory Director's post since both men are referred to as 'Secretary' in the protocols around the time of Nicander's appointment.⁵ Nicander's personal work in astronomy was apparently minor—even trivial—although this former mathematics Professor

was considered a good administrator. Rather, he became involved in demographics and in social issues. Nicander was finally succeeded by Jöns Svanberg.



Figure 9: The marble Meridian Line (foreground), inlaid with steel, on south lawn of the Stockholm Observatory. This was used up to about 1825, and extends from the 'Old Meridian Room'. Note the carved stone and metal observation posts in the background (photograph by the author).

Svanberg moved into the Observatory on 18 May 1803—a sure sign he was now in charge—and during his term the first inventory and publication of the Academy's holdings was carried out. Svanberg stood out, as had Wargentín before him, for the numerous measurements he took, but all were ancillary to astronomy since Svanberg's interest was in the flatness of the Earth. French scientist (and RSAS foreign member) J.J. Lalande had asked the question: "Was it as much as Maupertuis had measured?" In 1799 Svanberg travelled to Lapland to investigate this matter and he found it to be much less than Maupertuis had indicated. Lalande's congratulations (see Sinnerstad, 1989: 65) promptly followed, believing his Swedish colleague had finally solved a fifty-year puzzle in geodesy. Svanberg then published a 200-page book with a detailed outline of the problem. Svanberg was also interested in solar and lunar eclipse (but he only issued summaries of these), and in the Jovian satellites. It is interesting that there was a reported increase in amateur involvement in the activities at the Observatory during Svanberg's Directorship, indicating that he supported both amateur astronomy and amateur-professional collaboration.



Figure 10: The Reichenbach and Ertel transit telescope (foreground) and meridian circle (background) of the 1820s, now on display in the 'New Meridian Room' at the Observatory (photograph by the author).

Simon Anders Cronstrand succeeded Svanberg as Stockholm Observatory Director on 22 June 1811. His 'reign' coincided with Jacob Berzelius' time as Academy Secretary, and concerns regarding the position of the Swedish borders, matters relevant to defence—and possible offence—as well as trade. A plaque on the south façade of the Observatory informs visitors that from 1757 to 1827 the Swedish meridian for time-keeping and map-making was located along a white marble line on the south lawn. Although a new Meridian Line was laid 18 meters to the west in 1827 and the original Meridian Line was abandoned it has been preserved and is still there (see Figure 9). The 'Old Meridian Room' is situated behind this line, and it now contains the transit instrument shown in Figure 7. Cronstrand also found time to write a book on practical astronomy. Eventually ill health forced him into the role of Observatory Inspector, and he was succeeded by Nils Haquin Selander on 13 September 1837.

Selander was perhaps the most internationally-focussed of his three predecessors. Having served as temporary Academy Secretary he was in addition to this a Board Member of the Swedish Bank, and worked on currency reform (including the adoption of decimal currency). Selander was also a member of Parliament and, like Svanberg and Cronstrand, he was a Professor in the Topographical Corps. His most notable achievement as Observatory Director was to participate in the Scandinavian leg (Torneå-Stuor-Oivi) of the Russian initiative to measure Earth's meridian. This was a colossal undertaking that extended from the Donau River in the south to the polar shores in the north, and the aim was to determine the Earth's dimensions more accurately (see Batten and Smith, 2006: 71-72). While international studies of the Earth's magnetic field were intensified during this period, they were carried out earlier—even in Cronstrand's time—by delegated observers (e.g. see RSAS, 1821).

4.2 Notes on Repairs and Instruments at the Observatory, 1797-1875

In Nicander's time (1797) the cellar area, which was formerly Ekström's workshop and Observatory kitchen, was repaired, and in the 1810s (during Cronstrand's Directorship) remedial work was carried out on the floor and cobblestones. A donation from deceased RSAS member Abraham Niclas Edelcrantz may have been used to purchase new astronomical instruments in 1823 (see RSAS, 1823), and the RSAS protocols from the period 1818-1824 are replete with references to new meridian-measuring equipment, how the resident instrument-maker Gabriel Collin (and perhaps his son) were to make it, and with persistent regularity how a certain military officer requested that a 'globverkstad' (perhaps a globe-making or special map-making workshop) be built at the Observatory on behalf of the Government (*ibid.*). The protocol for 11 March 1824 notes the need for a new pendulum, perhaps for the astronomical clocks associated with the transit work (RSAS, 1824a).

The new meridian room ('vestra flygelsrum') project foreshadowed in the 29 November 1824 financial report is described in the 2 February 1825 protocol (see RSAS, 1825a), and the intended instruments—a

newly-purchased transit (probably by Reichenbach & Ertel) and a meridian circle—are mentioned. Discussions on the cost of this new facility are included in the 3 March 1825 protocol, which also refers to earlier deliberations held on 29 January and 23 February 1825 (RSAS, 1825b). Construction of the new meridian room was assigned to the architect Carl Christopher Gjörwell. Sketches of Observatory gates and fences were also prepared at this time, and Gjörwell's hand-wrought star patterns can still be seen on the existing gates.

Construction of the new room began in 1825, and it became operational in 1830 (see Figure 10). As if to underline the Stockholm Observatory's agenda in these years, the transit telescope was the only new 'cutting-edge' instrument of any size purchased since Wargentin's time. Installation of the new meridian line coincided approximately with the construction of the new meridian room, and Alm (1934) gives January 1827 as the date when the transit telescope was installed. Time-keeping and map-making were important activities at this time, and contact with the military was to continue, culminating in 1874 with the construction of a new dome specifically for the use of military personnel (see Alm, 19324, and '5' in Figure 11). From time to time mention is made in the protocols of new telescopes being obtained by the RSAS, but nothing resembling a major research telescope was purchased until the late 1870s.

The 'Great Magnet House' of 1838 (see Figure 11) was a joint project by Gjörwell and Samuel Enander early in Selander's term, with Enander apparently continuing this project after Gjörwell's death (see Alm, 1934). The building was for magnetic studies congruent with the geodesic and geophysical studies that predominated internationally at the time (e.g. RSAS foreign member Carl Friedrich Gauss's studies of geomagnetism). Meanwhile, plans for a new dome on the roof of the main Observatory building were agreed to in 1874, and J.E. Söderlund was appointed the renovating architect (RSAS, 1874).

5 HUGO GYLDÉN: AN ASTROPHYSICAL AGENDA

Hugo Gyldén (Figure 12) became Director on 10 May 1871, and was to lead the Stockholm Observatory for the next twenty-five years. Gyldén had a worldwide network of contacts and a reputation to match, and his leadership brought new equipment and a new research agenda to the Observatory and refocused astronomical research on the National Capital. But like many capital city-located observatories of the late nineteenth century rapid urban growth meant that its days were numbered.

Gyldén had previously worked under Otto Struve at the Pulkovo Observatory, and he immediately transferred the research focus of the Stockholm Observatory to Solar System astronomy and theoretical astronomy. Celestial mechanics was his main theoretical concern, and he still had to produce the *National Almanac*. By 1879 he was performing parallax measurements and stellar statistics and was studying perturbations in planetary motion. Like others at the time he also turned to astrophysics, investigating the relationship between stellar luminosity and distance; researching stellar motion; and experimenting successfully with stellar photography. He also edited the *Vierteljahrs-*

schrift of the Astronomische Gesellschaft from 1889 until his death in 1896 (Bergström and Elmquist, 2003).

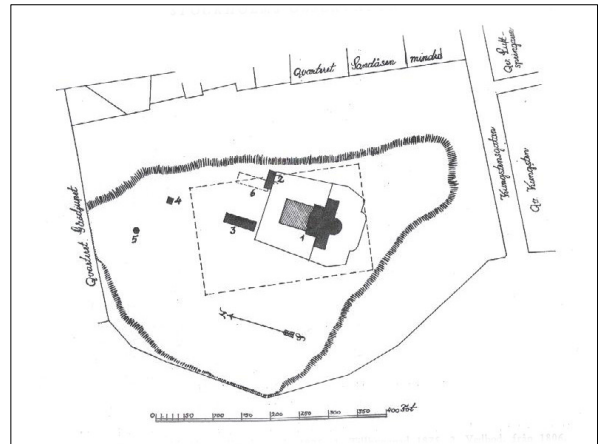


Figure 11: The Stockholm Observatory in 1875. 1: this building contained the 'New Meridian Room' (but a new dome was constructed on the roof in 1877); 2: a storeroom for firewood, which dates from 1806 (this area now houses outdoor meteorological instruments); 3: the 'Great Magnet House', which dates from 1838; 4: the 'Little Magnet House', which dates from the 1800s (this was later razed); 5: the dome for the use of the military general staff, which dates from 1874 (this, too, was later razed); 6: the annex which was built in 1881 but in 1875 was then in the planning stage—today it is a café (map after Alm, 1930: 167).

Unlike his opposite numbers at Uppsala and Lund Observatories, Gyldén was not hamstrung by a teaching schedule and could focus on research, but this did not prevent a number of the universities from making him offers (a particularly tempting one coming from Göttingen), and the nascent Stockholm University (Stockholm Högskola until 1960) even made him a Professor in 1888, without demanding any formal duties. This appointment would begin a collaboration between the Observatory and the University which would grow over time.



Figure 12: Hugo Gyldén, 1841–1896 (courtesy: Wikipedia Commons).



Figure 13: Stockholm Observatory today, showing the south façade (left) and the dome which replaced 'Hårleman's Lantern' in 1877 (cf. Figure 6). The 'great magnet house' in front of the north façade (not pictured) has a similar dome (photograph by the author).

5.1 Notes on Repairs and Instruments at the Observatory, 1875-1915

A new telescope and dome were priorities for Gyldén, given his research agenda, and Söderlund's 1874 drawings and costs estimate of 22,500 Swedish Krona for the dome (and perhaps even the telescope) were accepted (RSAS, 1874). Sadly, like Hårleman and Gjørwell before him, Söderlund would not live to see this project to completion, dying on about 5 August 1875 (RSAS, 1875). He was replaced by another architect, Per Ulrik Stenhammar, and the project continued—first under Stenhammar and later under the RSAS architect, F.G.A. Dahl—through to the unveiling in October 1877. Non-financial RSAS protocols from 1877 list the associated costs: the equatorial and passage (i.e. transit) instrument at 17,689 Krona (but with no mention of the actual telescope tube, or its manufacturer), with the dome and fees (which probably included telescope installation costs) coming to 33,000 Krona (RSAS, 1877). This was a very considerable sum, and it was necessary to dip into the RSAS reserve funds.



Figure 14: Carl Bohlin, (1860–1939) (courtesy: Astronomische Gesellschaft).

Presumably at some stage Gyldén also had extra living quarters for himself constructed in the main building, and it may be assumed that electricity was installed at the Observatory at about this time. Meanwhile, increased street and house lighting dating from this period of burgeoning urban growth in Stockholm must have begun to interfere with the astronomical observing.

The architect, Dahl, may also have been responsible for the dome that was installed on the roof of the Great Magnet House in the second half of the nineteenth century. This dome is similar to the dome on the main Observatory building (see Figure 13), and its design may have been 'borrowed' from Söderlund's earlier plans (although it was on a smaller scale). One of Dahl's last major projects for the Observatory was to design an observing facility for the solar eclipse of 1915 (*Kungl. Vetenskapakademiens Årsbok*, 1915).

The suite of astronomical instruments at the Observatory received a major boost in 1877 when a Repsold refracting telescope with an 18.9 cm Merz lens was purchased and installed in the new roof-top dome.⁶ The telescope was used by Gyldén for micrometric observations of comets and planets and for determining stellar parallaxes, and in 1887 it was equipped with a camera for astrophotography (see Petander, 2001). In 1892 the camera was improved (*ibid.*)—leading to impressive results—and in this same year the Merz lens on the telescope appears to have been replaced by a larger Steinheil objective (*ibid.*).

6 DECLINE AND TRANSFER TO MUSEUM STATUS

6.1 The Growth of Astrophysics Under Bohlin

Karl (Petrus Teodor) Bohlin (Figure 14) was made Observatory head on 19 February 1897. Like his predecessor, Bohlin had worked at Pulkovo as well as having been at the Astronomisches Rechen-Institut (which at that time was still attached to the Royal Berlin Observatory). Up until February 1897 Bohlin had been a Professor of Astronomy at Uppsala, and upon accepting the post at Stockholm Observatory, like his predecessor, he became a Professor at the Stockholm Högskola.

In general, Bohlin continued the wide-ranging research agenda that Gyldén had set. He investigated planetary perturbations as experienced by the minor planets, linking the severe perturbations to Jupiter. A recognised authority on globular clusters and nebulae, one of Bohlin's most notable achievements was to measure the distance to the Andromeda Nebula. He was also inspired by Percival Lowell's work at Flagstaff, and carried out systematic observations of Mars during the favourable oppositions of 1909-1910 and 1911-1912. The aforementioned 1915 solar eclipse, and one in 1921, were also duly observed from the south lawn of the Stockholm Observatory.

By 1920, if the Gyldén-Bohlin research agenda was to continue at the Stockholm Observatory the pressing need was for state-of-the-art equipment, and darker skies (to combat Stockholm's growing light pollution). Bohlin called attention to these two issues in 1921 (see Sinnerstad, 1989), but they were only addressed when the RSAS set up a committee in January 1927 to look into establishing a new observatory on a more suitable site. Bohlin retired on 20 October 1927.

6.2 Lindblad, the Move to Saltsjöbaden, and Notes on the Observatory's Post-Scientific Importance

Bertil Lindblad took over the Directorship of the Observatory on 21 October 1927 and on 1 January 1928 moved to Observatory Hill with his family. He contributed significantly to Stockholm Observatory as its final administrator and as a research astronomer (e.g. see Bergström and Elmqvist, 2003), although this latter aspect is beyond the scope of this paper.

The RSAS committee gave Lindblad the daunting task of establishing a new RSAS observatory at Saltsjöbaden, 15 km to the east, at an elevated dark site on the Swedish coast. By this time, Sweden was a much wealthier nation than in Wargentin's or Cronstrand's day, and funding for the move to Saltsjöbaden came in the form of a grant from the Knut and Alice Wallenberg Foundation. The Saltsjöbaden Observatory opened in 1931, complete with an English-made research telescope,⁷ and went on to distinguish itself as a research institution.

The City of Stockholm exercised its ancient legal right to take over the Brunkebergsåsen site in 1931 and turned it into a park. In September 1939 a statue of the Centaur by sculptor Sigrid Fridman was installed at the north-eastern corner of Observatory Hill, and is still readily visible to those visiting the eastern sector of the park (see Figure 15).

On 1 May 1934 the Geographical Institute at the Stockholm Högskola moved into the Observatory buildings, the city of Stockholm having granted permission for use of the premises at a nominal fee. Polar studies were the main preoccupation of the Institute, providing an interesting link with the era when magnetic studies were carried out at the Observatory. Adolf Erik Nordenskiöld observed the auroral ring around the North Pole in 1878-1879 during the RSAS-supported Vega Expedition to the North Pole, and assumed that the centre of this ring was sited near the geomagnetic and geographical North Poles.⁸ He considered the geomagnetic pole to be the 'pole of the Northern Lights', which later assisted K.R. Birkeland, an observer on the 1902-1903 Norwegian Aurora Polaris Expedition, who found a connection between the Sun, aurorae and geomagnetic storms. Cultural and natural geography at the Institute initially shared the Observatory facilities, but in 1960 the two were separated and the cultural geography staff moved to another site.

7 CONCLUDING REMARKS

On 1 April 1985 the Geographical Institute moved to the Stockholm University campus at Frescati, and for a while the old Observatory faced an uncertain future. From the start, its elevated position and domed structure appealed to the local Muslim community, and the City considered selling it to them. However, a foundation called Stiftelsen Observatoriekullen took on the task of making this, one of the oldest existing original astronomical observatories undisturbed by war, into a museum for the history of science by 1985. Their plan succeeded, but hit a snag on 20 September 1991—ominously, 238 years to the day since its original inauguration—when financial problems caused it to close the doors. Eight years later, the RSAS resumed ownership of the property and the Gamla Observatoriet was opened to the public once more. By offering

guided tours, attracting strollers to its new café, continuing outreach to selected professional and amateur astronomers, atmospheric scientists and historians, and attracting grants, this unique Swedish scientific museum continues to gain momentum. Hope is eternal that this gem of astronomical heritage will remain open and in the bosom of its founding institution for centuries to come.



Figure 15: The statue of the Centaur (photograph by the author).

8 NOTES

1. In support of this claim, Alm (1930: 108) refers to RSAS, 1746a.
2. Alm (1930: 109) notes that at the time the Government reserved the right to re-acquire the property if the RSAS should no longer require it.
3. Alm (1930: 114) states that the permission to build is mentioned in Stavenov, 1927: 197.
4. Mapping probable diseases at this time with the almanac's aid was pointed out by Dr Tore Frängsmyr (pers. comm., May 2008).
5. The 'make' of this telescope was not listed in the RSAS protocols at the time, but this information is included in an inventory of the Observatory's instruments that was prepared in 2 July 1925 (see Petander, 2001).
6. At Saltsjöbaden the old Repsold refractor was initially used as a training telescope or a guide telescope—or both—but it was eventually dismantled and placed in storage.
7. Artefacts associated with Nordenskiöld's polar exploration are now on display at the Observatory, reflecting the era when the Geographical Institute occupied the building.

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RSAS = Royal Swedish Academy of Sciences.

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- RSAS, 1747. Protocol dated 17 October (importance of almanac sales, monopoly established) (p. 197, 5: RSAS Dagböcker 1742-1751).
- RSAS, 1749. Protocol dated 2 October (Wargentin as astronomical observer, secretary) (p. 273: RSAS Dagböcker 1742-1751).
- RSAS, 1751. Protocol dated 8 June (fire) (pp. 364-365: RSAS Dagböcker 1742-1751).
- RSAS, 1753a. Protocol dated 24 March (delays) (p. 423: RSAS Dagböcker 1752-1763).
- RSAS, 1753b. Protocol dated 15 September (von Höpken's official announcement of intended opening) (p. 436: RSAS Dagböcker 1752-1763).
- RSAS, 1753c. Protocol dated 20 September (the inauguration) (pp. 436-438: RSAS Dagböcker 1752-1763).
- RSAS, 1754. Protocol dated 26 January (almanac sales) (p. 455: RSAS Dagböcker 1752-1763).
- RSAS, 1755. Protocol dated 5 July (Ekström's demise and his suggested successors) (pp. 499-500: RSAS Dagböcker 1752-1763).
- RSAS, 1784. Protocol dated 21 January 1784 (Nicander and Wilcke are both listed as 'Secretary') (p. 1469: RSAS Dagböcker 1784-1790).
- RSAS, 1821. Protocol, p. 8 ('Astronomiske observatör Kniberg' performs magnetic observations at the Observatory).
- RSAS, 1823. Protocol, pp. 76-77 ('Globverkstaden' first discussed with the Observatory head by the Swedish military—probably the Navy).
- RSAS, 1824. Protocol dated 24 March (new clock pendulum). RSAS RSAS Dagböcker 1822-1826).
- RSAS, 1825a. Protocol dated 2 February (the west annex, or 'new meridian room', receives tentative approval, indicating that the new transit and the existing meridian circle are to be installed there) (p. 12: RSAS Dagböcker 1822-1826).
- RSAS, 1825b. Protocol dated 3 March (cost discussions of the new room referred to on 29 January and 23 February 1825) (pp. 25-26: RSAS Dagböcker 1822-1826).
- RSAS, 1874. Protocol (Dagböcker) pp. 105 (8:7), 127 (8:18) (cost estimates, south façade dome, instruments).
- RSAS, 1875. Protocol (Dagböcker) p. 59. (Per Ulrik Stenhammar, 'architect', replaces Söderlund, whose death is noted as 5 August 1875 according to secondary sources).
- RSAS, 1877. Protocol (Dagböcker) pp. 53-54. (A new dome and all related costs are inventoried; no mention of the inauguration of the dome).
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APPENDIX 1: STOCKHOLM OBSERVATORY DIRECTORS FOLLOWING WARGENTIN

The following information is based on Dahlgren (1915), *Personregister ...* and Skottsberg (1957).

- Nicander, Henric (1744–1815) named Wargentin's assistant on 13 November 1776 (Personförteckningar, 1739-1915). Elected RSAS Secretary in 1784 (Personregister: 1742-1790).
- Svanberg, Jöns (1771–1851) moved into the Observatory to live on 18 May 1803 (Personregister: 1803:20: 1791-1830), and assumed control of all Observatory instrumentation on 4 April 1804; he was made RSAS Secretary on 30 May 1804 (and also had religious orders unrelated to RSAS duties) (Personregister: 1804:52, 55:c: 1791-1830).
- Cronstrand, Simon Anders (1784–1850) became Observatory Director on 22 June (or possibly July?) 1811 ("1811 22/6 § 7") (Personregister: 1811:19: 1791-1830).
- Selander, Nils Haquin, became Observatory Director on 13 September 1837 (Personförteckningar 1739-1915).

Glydén, Johan August Hugo, became Observatory Director on 10 May 1871 (Personförteckningar 1739-1915).

Bohlin, Karl Petrus Teodor became Observatory Director on 19 February 1897 (Personförteckningar 1739-1915).

Lindblad, Bertil became Observatory Director on 21 October 1927 (Personförteckningar 1915-1955).

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