MEETING VENUS
C. Sterken, P. P. Aspaas (Eds.)
The Journal of Astronomical Data 19, 1, 2013

The Amateur Astronomer Anders Hellant and the Plight of his Observations of the Transits of Venus in Tornio, 1761 and 1769

Osmo Pekonen

University of Jyväskylä, Finland

Abstract. Anders Hellant was a versatile Swedish amateur scientist whose figure dominated eighteenth century intellectual life in Tornio, his little home town of some 500 inhabitants at the mouth of the Tornio river.

My study is mainly based on the biographies published in Finnish (Boström 1918) and in Swedish (Tobé 1991) but I have also consulted some original sources in Paris and in Stockholm. Hellant incarnated almost all by himself the inquiring scientific spirit of the Age of Enlightenment in Swedish Lapland. There is much to be said about his life and works, but here I focus on his observations of the Venus passages in 1761 and 1769.

1. A biographical sketch

Anders Hellant (1717–1789) was born on November 30, 1717. His family was in exile from its native Tornio[1] at the Korteniemi manor in Pello, not far from the Arctic Circle, fleeing the atrocities committed by Russian troops that occupied Finland since 1713 during the Great Northern War 1700–1721. His father was the merchant Anders Hellant Sr (1687–1746); his mother Britta Hermansdotter Kempe (1686–1739) who was cousin to Mickel Henriksson Korteniemi, the owner of the famous Korteniemi manor, often qualified as the northernmost guesthouse of the Swedish realm (Fig. 2). Hellant spent most of his life in Tornio, the northernmost town of the kingdom, founded in 1621. Tornio was important as a commercial gateway to Lapland, and also Russian merchants regularly attended its ancient market held in the island of Suensaari. The Hellant family belonged to the Swedish-speaking elite whereas the common people's language was Finnish. Divine services were held in both languages in the two parishes of Tornio.

Hellant received his early education in the school of Tornio, established in 1630. His teacher was Johan Wegelius the Younger (1693–1764), a well-known Pietist leader and at the end of his career the vicar of Oulu. In 1733–1739 Hellant was enrolled as a student of law, economy and mathematics at the University of Uppsala. Among his teachers were the mathematician Samuel Klingenstierna (1698–1765) and the astronomer Anders Celsius (1701–1744); he also interacted somewhat with Carl von Linné (1707–1778) who had made his famous trip to the Tornio river valley in 1732. Hellant was introduced to a wide spectrum of natural sciences but the topic of his bilingual thesis – the first one ever published in economy in both Swedish and

[1]Tornio is known in Swedish as Torneå, the Tornio river as Torne. We use the Finnish name forms because the town of Tornio (Fig. 1) nowadays is in Finland. Since 1809, the Tornio river forms the boundary between Sweden and Finland but this was not the case in Hellant's lifetime when Finland belonged to the kingdom of Sweden. Culturally and administratively, Tornio was not a part of Lapland, and not even of Finland, before 1809. Rather, it used to belong to the province of Västerbotten. Few Lapps have lived in the area in historical times.

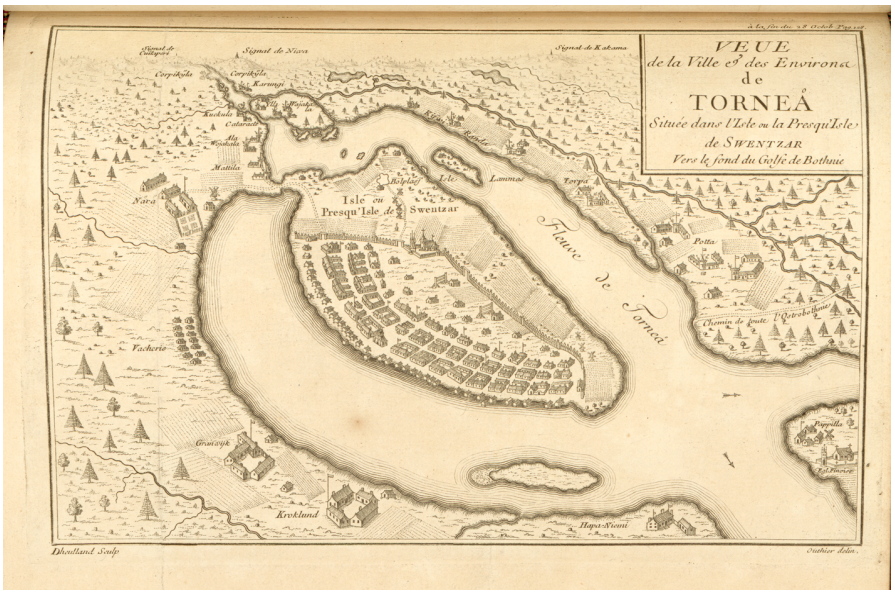


Figure 1. Hellant's home town Tornio as drawn by abbé Réginald Outhier in his *Journal d'un voyage au Nord* (1744).

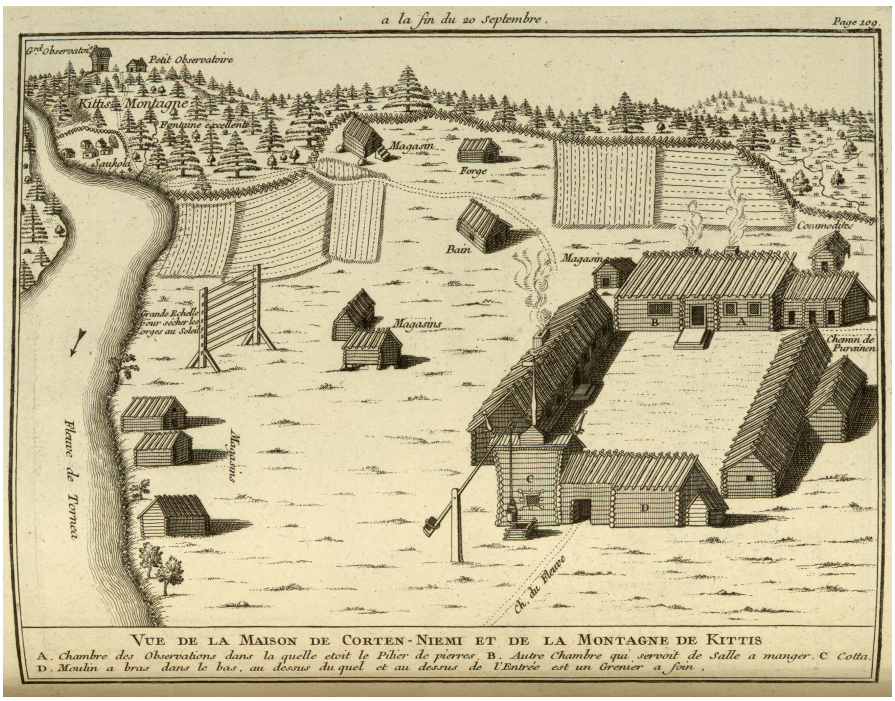


Figure 2. The historical Korteniemi manor, the northernmost inn of Sweden not far from the Arctic Circle, served as a basis of several scientific expeditions to Lapland, including those of Maupertuis in 1736–1737 and of Mallet in 1769. Unfortunately, the buildings were destroyed by the German army in 1944. Drawing by abbé Réginald Outhier in his *Journal d'un voyage au Nord* (1744).

in Latin – was typical of the utilitarian concerns of his epoch: *Et nyt sätt at fiska i the norländska elfwer / De novo in fluviis Norlandiarum piscandi modo*.[2] Hellant had written his thesis himself, which was not the general rule in the eighteenth century. During his student years Hellant also worked as a scribe in the chancellery of Västerbotten province in Umeå.

The determining experience of Hellant's life was his association as a young man in 1736–1737 in the work of the geodetic expedition of Pierre Louis Moreau de Maupertuis (1698–1759) which was dispatched to the Tornio river valley by the *Académie Royale des Sciences* to measure the shape of the Earth. Under Maupertuis' leadership, the expedition included the French academicians Charles Étienne Louis Camus (1699–1768), Alexis Claude Clairaut (1713–1765), Pierre-Charles Le Monnier (1715–1799), abbé Réginald Outhier (1694–1774) and, as a representative of Swedish science, Anders Celsius who had joined the expedition already in France. Hellant spoke some French and served as interpreter and local guide. He also took part in the practical art of land surveying between Tornio and Pello and developed remarkable skills as an amateur scientist. Maupertuis' expedition established its place in the history of science by demonstrating that our globe is slightly flattened around its poles due to its rotational movement, precisely as Newton had predicted (Terrall 2002, Pekonen 2010). Hellant promptly translated Maupertuis' research report into Swedish (Maupertuis 1738).

2. An enlightened economist

Later, for almost half a century, Hellant was one of the most influential persons not only in his native Tornio river valley, but in all of Swedish Lapland. He was nominated as *Oeconomie Directeur* of Lapland, and he had many initiatives to develop Lapland's economic life. However, his attempt to create an industry to extract glue from reindeer horns proved a failure. He also served as district judge of Lapland, and he often traveled for months inspecting the poorly charted Northern possessions of His Majesty the King of Sweden. In 1748–1766, he took part in the work of the Swedish–Danish border commission to establish the frontier between the two kingdoms in Lapland. In this quality, he made several journeys until the Arctic Ocean proceeding until Tana fjord and to the Vardø fortress (Vardøhus). He dreamed of visiting the North Cape but never did so. His visit to Vardø can be qualified as a spying operation because he closely inspected the new fortress achieved in 1738 and deposited a detailed report on its structure to military authorities in Stockholm.

Despite his industrial enterprises and administrative duties, Hellant found leisure to pursue his scientific interests as well. His observations range from astronomy to meteorology, from geomagnetism to *Aurora Borealis*. Field work was a way of life for Hellant. Wherever he traveled in Lapland, he made diligent observations of various natural phenomena. Only a fraction of the data that he collected was ever published.

He understood the relationship of intense Northern lights to deviations of magnetic declination. He also tried to measure by triangulation the height of aurora borealis. A precious set of cryophenological data that Hellant managed to compile is an unbroken sequence of the dates of ice break-up in the river Tornio since 1693 – a unique time series from an arctic river in the world which may serve to demonstrate

[2] "A new way of fishing in the rivers of Norrland", 1738.

the reality of climate change (Kajander 1993). Hellant also was among the first scientists to measure the slow land uplift of the Western shores of the Gulf of Bothnia. (As a matter of fact, the land uplift also affects the dates of ice break-up.) Lapland at large was the subject of considerable scientific interest in the eighteenth century, especially in France (Pihlaja 2009).

Hellant collected an important private library featuring works of Cassini, Delisle, Euler, Fontenelle, Linné, MacLaurin, Maupertuis, Newton, Voltaire, Wolff, etc. (Tamelander 1941, pp. 166–171). He was musically gifted, playing the flute. He left behind a variety of musical instruments and a large collection of notes.

In 1751 Hellant was elected member of the Royal Swedish Academy of Sciences. He contributed no less than 18 papers for the Transactions (*Handlingar*) of the Academy between 1745 and 1786, and he was in extensive correspondence with Pehr Wilhelm Wargentin (1717–1783), the long-time secretary of the Academy (Fig. 3). Since 1784, he also was a corresponding member of *Musée de Paris*, an esoteric society founded by the mystic Antoine Court de Gébelin (ca.1719–1784).

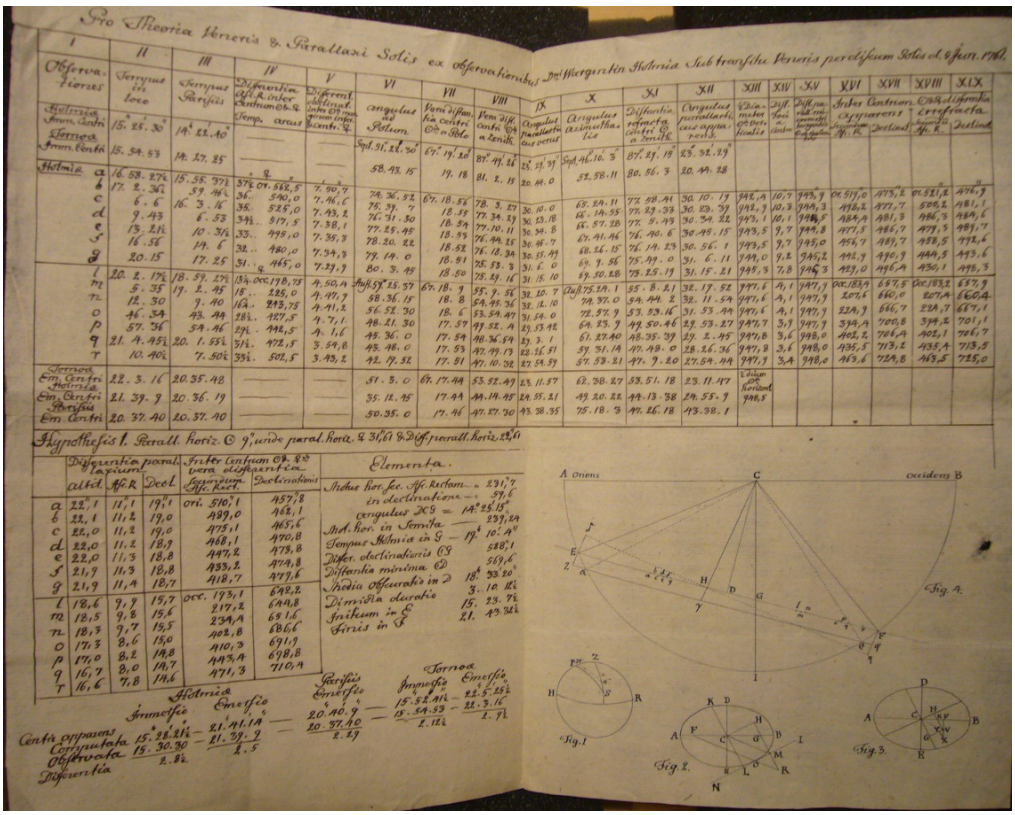


Figure 3. Wargentin's compilation of Swedish Venus observations made in 1761 includes Hellant's data from Tornio. Source: Archives of the Royal Swedish Academy of Sciences, Stockholm. Photo by Johan Stén.

Hellant never married but he had a female house keeper Brigitta Widte who also served as an assistant for his scientific observations. Critical visitors, like the caustic Uppsala-based astronomer Fredrik Mallet (Fig. 4), perceived him as a libertine, a free-thinker and moreover a charlatan in astronomy (Nordenmark 1946, p. 75).

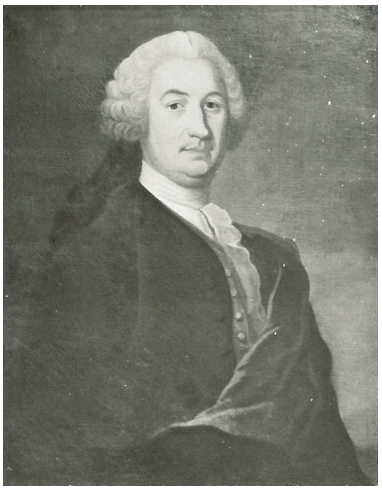


Figure 4. Fredrik Mallet (1728–1797). Oil painting by Arenius (?) in the Observatory of Uppsala.

3. Creation of an observatory

The departing Maupertuis expedition had left Hellant with one of its telescopes, a seven-foot tube. This was the semen of the northernmost permanent observatory of the world, *Observatorium Tornense*, which Hellant established in Tornio (Fig. 5). The Royal Swedish Academy of Sciences appreciated Hellant's activities and supplied additional equipment.

Hellant perceived Observatorium Tornense as a crucial pinnacle of a global observational network in emergence. In 1751, he participated in an international campaign of observations to determine the Moon's parallax from simultaneous observations roughly along the meridian of the Cape of Good Hope where abbé Nicolas Louis de La Caille (Lacaille, 1713–1762) had installed an observatory; as a matter of fact Tornio is six degrees off that meridian. In a letter (dated November 20, 1758) to Count Anders Johan von Höpken (1712–1789), president of the Royal Chancellery, Hellant pleaded, among other concerns, for the creation of similar permanent observatories in the Cape of Good Hope, in South America, and in North America – a dream that has become reality only in modern times.

The first version of Observatorium Tornense was destroyed in the great fire that devastated Tornio in 1762. Hellant rebuilt the observatory in the form of an octagon whose sides measured more than 3 meters.

Hellant edited and printed twice (for the leap years 1744 and 1748) an almanac according to the horizon of Tornio (see Fig. 6). His almanacs did not indicate the Moon's Metonic cycle of 19 years as Hellant did not believe anymore in the Moon's influence on weather.

4. Observations of the Venus passages

The passage of Venus early in the morning of June 6, 1761 was observed in Tornio with four telescopes. Hellant used his own 20-foot telescope whose objective had been prepared by Samuel Klingenstierna and the ocular ground by Carl Lehnberg. Captain Lagerbohm who was reputed to have sharp eyes operated a 32-foot telescope of the Royal Academy that had been constructed by Lehnberg. Bailiff Häggman had an $8\frac{1}{2}$ foot telescope endowed with a micrometer. These three telescopes had a red-brown glass for eye protection. The 7-foot telescope that Maupertuis' expedition had

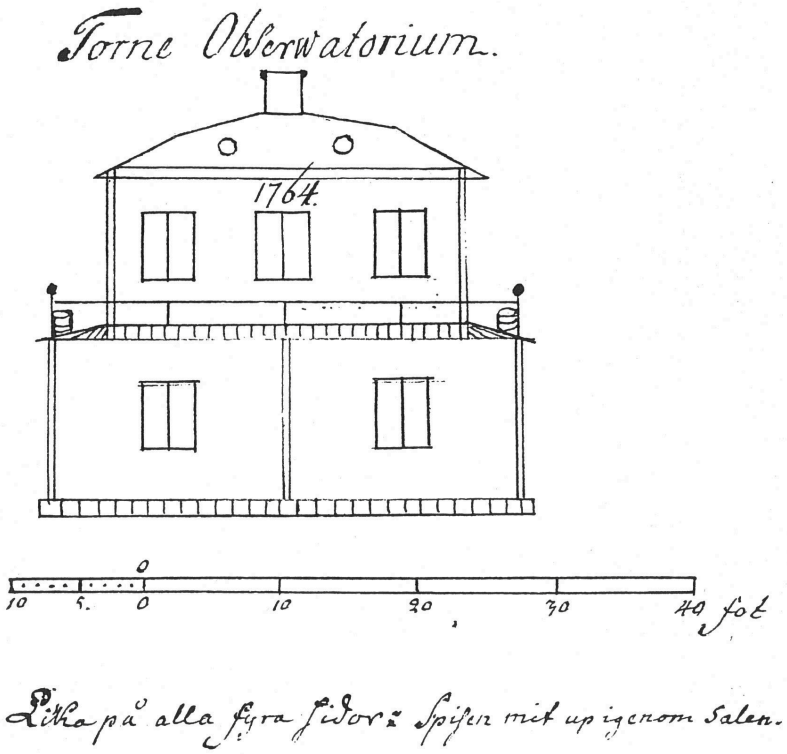
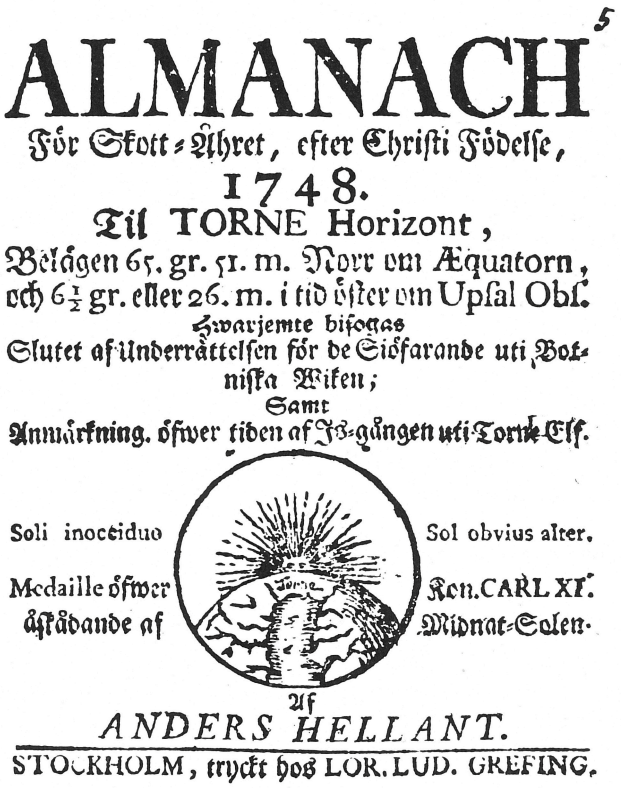


Figure 5. Observatorium Tornense, the world's northernmost permanent observatory in its day, as drawn by Hellant in a letter to Wargentin in 1764. Source: Archives of the Royal Swedish Academy of Sciences, Stockholm.

left to Hellant was operated by merchant Burström and by mine-owner Steinholtz and arranged as a helioscope in a dark room where the transit of Venus could be observed on a white board by the general public. Hellant reports to have invited all the "nymphs" of the town. The seconds were counted with two pendulum clocks which had been calibrated to even temperature of 15 to 16 centigrade.

The amateur team delivered a lot of data to Stockholm, but the figures were approximative and contradictory. The weather was all fine, except for a single cloud that stubbornly followed the Sun. The first contact (external ingress) was missed altogether. As for the second contact (internal ingress), Hellant obtained the time as something between 04:03:54 and 04:03:59 a.m. whereas Lagerbohm got 04:04:01. The third contact (internal egress) took place between 09:54:06 and 09:54:08 according to Hellant but rather at 09:54:18 according to Häggman and 09:54:22 according to both Lagerbohm and those in the camera obscura. The timing of the fourth contact (external egress) scattered even more: 10:11:58 according to both Häggman and camera obscura; 10:12:14 according to Lagerbohm; 10:12:22 according to Hellant. Despite Hellant's enthusiasm and self-confidence, his observations proved unreliable and virtually useless from a retrospective point of view. Nonetheless, Wargentin communicated them to Paris where Hellant's data was presented to the *Académie Royale des Sciences* on May 8, 1762.

In 1769, the Venus passage took place during the night between June 3 and 4 and was fully observable only in the northernmost part of Scandinavia against the backdrop of the Midnight Sun. The Royal Academy of Sweden realized the value of Venus observations obtainable from Lapland and didn't want to entrust


ALMANACH 5

För Skott-Åhret, efter Christi Födelse,

1748.

Til TORNE Horizont,

Belägen 65. gr. 51. m. Norr om Æquatorn,
och 6½ gr. eller 26. m. i tid öster om Upsal Obs.

Hwarjemte bifogas
Slutet af Underrättelsen för de Siöfarande uti Bothniska Wiken;
Samt
Anmärkning. öfwer tiden af Is-gången uti Torne Elf.

Soli inocciduo — Sol obvius alter.

Medaille öfwer åskådande af — Kon. CARL XI. Midnat-Solen.

Af

ANDERS HELLANT.

STOCKHOLM, tryckt hos LOR. LUD. GREFING.

Figure 6. Front page of Hellant's 1748 almanac. The medallion commemorates the visit of King Charles XI of Sweden to Tornio to observe the Midnight Sun in 1694.

the work to amateurs anymore. Fredrik Mallet (1728–1797), the *Observator Regius* of the Uppsala observatory, was dispatched to the Arctic Circle. Together with an assistant, Daniel Hallencreutz, he started his journey from Uppsala already on August 15, 1768. On their way, the two men also contributed to general land surveying of the coasts of the Gulf of Bothnia. Mallet met with Hellant in Tornio at the end of April 1769. Wargentin had recommended Hellant as an assistant but Mallet's perception of Hellant, as we have seen, was entirely negative. Checking the three meridians traced by Hellant, he found deviations up to $27\frac{1}{2}$ arc seconds. According to Mallet, Hellant was "somewhat stubborn and full of ideas" but lazy in bringing them to reality (Nordenmark 1946, p. 75).

Hellant advised Mallet to continue to Pello, beyond the Arctic Circle, and house in the Korteniemi inn where Mallet arrived on May 12. *"May God allow Venus to be observed in Pello as well as in Stockholm"*, Mallet wrote to Wargentin. These prayers were not heard, however. The observations both in Pello and in Tornio during the night of 3 to 4 June 1769 failed because of cloudy weather. Mallet caught a glimpse of Venus at 09:45 p.m. (local time) and another one during four minutes at 02:00 a.m., but he missed the moments of ingress and egress. Hellant, on the other hand, caught a glimpse of Venus at about 03:00 a.m. but that was all. *"I am angry with Venus for ever; and I wish I could take revenge on her"*, Mallet wrote to Johan

Henrik Lidén, a friend in London, in a letter dated in Åbo, Finland, on September 9, 1769.

Wargentin had expressed doubts about the authenticity of Maximilian Hell's observations when they were communicated in 1770. Astronomers wondered why Hell had waited so long before releasing his data. Anders Planman (1724–1803), a docent of Uppsala who had obtained observations from Kajaani in Finland both in 1761 and in 1769, openly suspected Father Hell of having fiddled with his figures.

As late as on December 8, 1772 Wargentin writes to Planman telling him that Hellant had been asked to *"spy how the Jesuits had behaved in Vardøhus"*. Indeed, Hellant traveled every year to northernmost Lapland and had a good number of local informants. Even so, it appears extraordinary that more than three years after the events he was asked to find out what the weather had been like in Vardø when the Jesuits made their observations of Venus. Hellant indeed had interviewed a merchant named Wadell whom he had met at Utsjoki and who could confirm that the weather in Vardø had been fine.

Among other things Hellant also observed the oscillating variable star Mira in the constellation Cetus and the transits of Mercury at least in 1753 and 1786.

5. Conclusion

Anders Hellant in 1761 and 1769, and Fredrik Mallet in 1769, were the northernmost observers of the transit of Venus in Sweden. Hellant enthusiastically communicated his amateur observations to Wargentin, the secretary of the Swedish Academy of sciences, who shared his data with colleagues in Paris. It seems, however, that no significant use was made of Hellant's data of 1761 which was printed in Stockholm but only survives as a manuscript in Paris. This must be due to the highly scattering and scientifically mediocre quality of the figures obtained by Hellant's team. In 1769, on the other hand, the observations of both Hellant and the more professional Mallet failed altogether. The truly significant Venus observations in Sweden were made by Anders Planman in Kajaani both in 1761 and in 1769. Planman's results immediately entered international literature, whereas Hellant's contribution is rarely mentioned.

Hellant is an interesting figure for many other reasons as arguably the foremost exponent of the spirit of Enlightenment in eighteenth-century Swedish Lapland. His rightful place in the history of science is due, first of all, to his participation as a young man in the expedition of Maupertuis to measure the shape of the Earth.

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