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Strasbourg's "First" Astronomical Observatory

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The turret lantern located at the top of the Strasbourg Hospital Gate is generally considered as the first astronomical observatory of the city, but such a qualification must be treated with caution. The thesis of this paper is that the idea of a tower-observatory was brought back by a local scholar, Julius Reichelt (1637–1717), after he made a trip to Northern Europe around 1666 and saw the *Rundetårn* (Round Tower) recently completed in Copenhagen. There, however, a terrace allowed (and still allows) the full viewing of the sky, and especially of the zenith area where the atmospheric transparency is best. However, there is no such terrace in Strasbourg around the Hospital Gate lantern. Reichelt had also visited Johannes Hevelius who was then developing advanced observational astronomy in Gdańsk, but nothing of the kind followed in Strasbourg. Rather, the Hospital Gate observatory was built essentially for the prestige of the city and for the notoriety of the university, and the users of this observing post did not make any significant contributions to the progress of astronomical knowledge. We conclude that the Hospital Gate observatory was only used for rudimentary viewing of bright celestial objects or phenomena relatively low on the horizon.

Die Turmlaterne auf der Spitze des Straßburger Hospitaltores wird allgemein als die erste Sternwarte der Stadt angesehen. Solch eine Kennzeichnung muss aber mit Vorsicht betrachtet werden. In der hier vorgestellten These wurde das Konzept einer Turmsternwarte von dem lokalen Gelehrten Julius Reichelt (1637–1717) von seiner Reise nach Nordeuropa 1666 zurückgebracht, nachdem er den damals gerade fertiggestellten *Rundetårn* (Rundturm) in Kopenhagen gesehen hatte. Dort jedoch erlaubt bis heute eine Terrasse die Beobachtung des gesamten Himmels, und insbesondere des Zenits, wo die atmosphärische Transparenz am besten ist. Dies ist in Straßburg wegen des Fehlens einer solchen Terrasse nicht möglich. Reichelt hatte in Danzig Johannes Hevelius besucht, der damals fortschrittliche astronomische Beobachtungstechniken entwickelte. Nichts davon klingt in Straßburg nach. Die dortige Turmlaterne wurde im Grunde genommen wegen des Geltungsdrangs der Stadt und des Bekanntheitsgrads der Universität gebaut. In der Astronomiegeschichte hat sie in der Folge keine Rolle gespielt. Da man keine Aufzeichnungen der Nutzer dieses Beobachtungsorts in den Annalen der astronomischen Wissenschaft findet, ist zu folgern, dass die Spitze des Hospitaltors höchstens für gelegentliche Beobachtungen von hellen Himmelsobjekten oder anderen Phänomenen in relativer Horizontnähe genutzt wurde.

1 Introduction

Strasbourg's Hospital Gate is one of the very few extant remnants of the old city walls. It houses today a water tank (no longer in use) for the adjacent hospital, as well as a small meeting room, a few offices and storage areas for the hospital acquisition and contract services. The tower features at its top a *lanternon* (turret lantern), identified as the first astronomical observatory of the city built in the second half of the 17$^{\text{th}}$ century. Local historians and amateur astronomers have been repeating this over and over in all kinds of publications, often quoting each other and without proper historical referencing. We therefore decided to investigate the *lanternon* in the historical context of the time and from the point of view of a professional astronomer interested in the inventive progress of our science, as opposed to the stand taken by some historians more attracted to, say, anecdotical facets of astronomy or an amateur's perspective. We went back to the original documents in various archive vaults. Those mentioned in this paper are referenced as AVCUS (for the Strasbourg City Archives), DK-RA (for the Danish Royal Archives) and DK-RB (for the Danish Royal Library), followed by the serial number and/or date of the document.

The historical complex of Strasbourg Hospital Gate, most likely built in the first half of the 14$^{\text{th}}$ century, has been described by others (see e.g. Waton et al. 2000, as well as the references therein). We are interested here only in the inside, higher tower, the only element remaining today. We obtained the authorization to visit the turret several times with the assistance of the hospital security team. It is in reasonably good shape if one ignores the layer of pigeon excrement and the bodies of a few dead birds. The octogonal turret has an approximate diameter of 265 cm, each side offering a rectangular window (twelve squares) of about 75 cm $\times$ 100 cm, with a base about 85 cm above the floor, topped by a half-circular structure in seven glass elements (total height of about 75 cm). The roof of the *lanternon* is an octogonal pyramid with a basis located at about 50 cm above the window top (approx. 310 cm above the floor). From a 1 m level at the center of the octagon,[1] this roof induces a dead angle of about 80° around the zenith, reduced by slightly more than half by moving from window to window.[2]

The trap closing the access of rather narrow and steep stairs has now disappeared, but the traces and notches of hinges are still visible. From collected representations (sketches, drawings and photographs), the general

[1] A reasonable low level for positioning the eye on an astronomical instrument at that time (remember also that people were shorter then).

[2] The usage of an instrument (quadrant, sextant, optical device) must be abandoned in extreme positions.

Figure 1. The top of Strasbourg Hospital Gate before it was covered by the turret lantern (1671 pen-and-ink sketch by Joh. Jacob Arhardt) and nowadays (© *Cabinet des Estampes*, reproduced with permission, & A. Heck).

aspect of the tower did not change over the centuries. Figure 1 compares a current view with a 1671 pen-and-inch sketch by Arhardt showing the top of the tower shortly before it be covered with the turret. The structure visible then on the terrace is likely a shelter (perhaps for watchers, equipment or access stairs).

2 Julius Reichelt

Visitors to a recent exhibition[3] organised by the City Archives of Strasbourg were able to see an interesting document: the obituary of a local

[3]On the theme *"Les Strasbourgeois et la Mort du Moyen Âge à nos Jours"* (People from Strasbourg and Death, from the Middle Ages till Nowadays), February–June 2009.

mathematician, Julius Reichelt (1637–1717).[4] This scholar had already come to our attention, as several sources credited him with creating what was called the first astronomical observatory of the city, located at the top of the Hospital Gate.

The main elements of Reichelt's life were provided in the obituary and are now available in most local biographical resources. For what is of interest here, let us note: his birth on 5 January 1637 in Strasbourg; his enrolment as student on 16 October 1644 *(Matricula Scholae Argentoratensis 1621–1721)*; his graduation as Doctor of Philosophy on 26 April 1660; his nomination as Professor of Mathematics at Strasbourg Gymnasium in 1667;[5] his repeated Deanship; and his death in Strasbourg on 19 February 1717 – at the age of eighty, in line with the fact that astronomers and associated scientists have in general enjoyed a particularly long life (Heck 2008).

Shortly after his graduation, Reichelt lobbied to secure funding for a study trip in Northern Europe. He attempted to get both the academic and city authorities to jointly agree on the financing: the former because they saw in Reichelt the possible next occupant of a Chair of Mathematics vacant since the death of Jakob Bartsch (1600–1633) (see e.g. AVCUS V44/68); and the latter because of military information on fortifications the erudite mathematician could bring back from such a trip (see e.g. AVCUS 1AST426 dated 22 October 1661). Interestingly, only scientific motivations appear on what seems to be a save conduct (AVCUS V46/53), possibly to facilitate his passage through the various states crossed.

This duality of approach by scientists seeking funding has nothing exceptional, but in Reichelt's case it is appropriate to see whether his trip actually resulted in effective scientific and/or military contributions.

3 Reichelt's Trip in Northern Europe

Reichelt's obituary (AVCUS 1AST446/50, 21 Feb 1717) is typical of times in which he lived in that importance came from the people one had the opportunity to meet (or to listen to). Khun lists a series of high-profile scientific and military personalities whom Reichelt would have met – an impressive assemblage for a recently-graduated young man taking his first

[4]Obituary by Johann Kaspar Khun (sometimes spelled Kuhn): Sarrebrück, 1655 – Strasbourg, 1720. Document referenced as AVCUS 1AST446/50 (21 Feb 1717).

[5]Berger-Levrault (1892), echoed by several 20$^{\text{th}}$-century biographical compilations, mentions 1673, which is incompatible with original documents (e.g. AVCUS 1R150 from 12 Aug 1667), confirmed by an anonymous compilation of professors dated 1765 (AVCUS 1AST344/28).

trip abroad. Probably one must see in such a listing a stylistic contraction of contacts established (perhaps only claimed or attempted) by Reichelt in the course of his life.

Among others are mentioned the mathematician Jan Hudde (or Huddenius, 1628–1704) from Amsterdam; the astronomer Johannes Hevelius from Gdańsk (see below); the mathematician Andreas Concius (1628–1682) from Königsberg; military officers and specialists in fortifications like Axel Vrop (or Urup, 1601–1671), the Hoffmann brothers,[6] as well as Hendrik Ruse (or Baron Rusenstein, 1637–1679); the cartographer Johannes Meyer (1606–1674); the physician and physicist Rasmus Bartholin (1625–1698) and the Danish astronomer Villum Lange (or Gulielmus Langius, 1624–1682) whom we shall meet again; and the librarian Adam Olearius (1601–1674) who was attached to the Duchy of Schleswig-Holstein-Gottorp and known for his trips to Persia.

According to the obituary, the regions visited by Reichelt were Holland, Holstein, Jutland, Denmark and Prussia. Very few documents remain from this trip, but a couple of them can be usefully exploited here. Thus Copenhagen was at the time a city surrounded by walls, and its commandant kept a register of all foreigners entering the town through the four gates. Reichelt was recorded clearing Copenhagen's *toldbod* (customs) on 12 August 1666, together with a few other travellers coming from Gdańsk (see Figure 2).

Copenhagen's *Rundetårn* (Round Tower), built between 1637 and 1642, belongs to the *Trinitatis* complex, designed to provide the students of the time with a church and a university library, together with an astronomical observatory. Used by the University of Copenhagen until 1861, the observatory on top of the Round Tower is the oldest European observatory still operational (but nowadays only for non-professional observing). Ole Rømer (1644–1710) has been one of the prestigious users of the Round Tower, but his determination of the speed of light was made during his stay at Paris Observatory between 1672 and 1681.

Reichelt arrived in Copenhagen about a quarter of century after the completion of the Round Tower. It was then managed by Villum Lange, assisted by Rasmus Bartholin, who was one of Ole Rømer's teachers. Bartho-

[6]Born in Lubań (Silesia), Gottfried Hoffmann (ca 1631–1687) studied in Leipzig and Strasbourg before entering service for the Danish crown in 1648. He was following an elder brother, Georg, who also studied in Leipzig and Strasbourg before entering the Royal Danish service in 1643, probably after some experience in fortifying several European cities. He died in 1666. In 1667/68, Reichelt attempted to get Gottfried Hoffmann as military engineer for Strasbourg, but his salary demands were too high (Westerbeek Dahl 1992, and personal comm.; see also AVCUS 4R20 dated 01 May 1668). Strasbourg was counting its pennies as we shall also see hereafter.

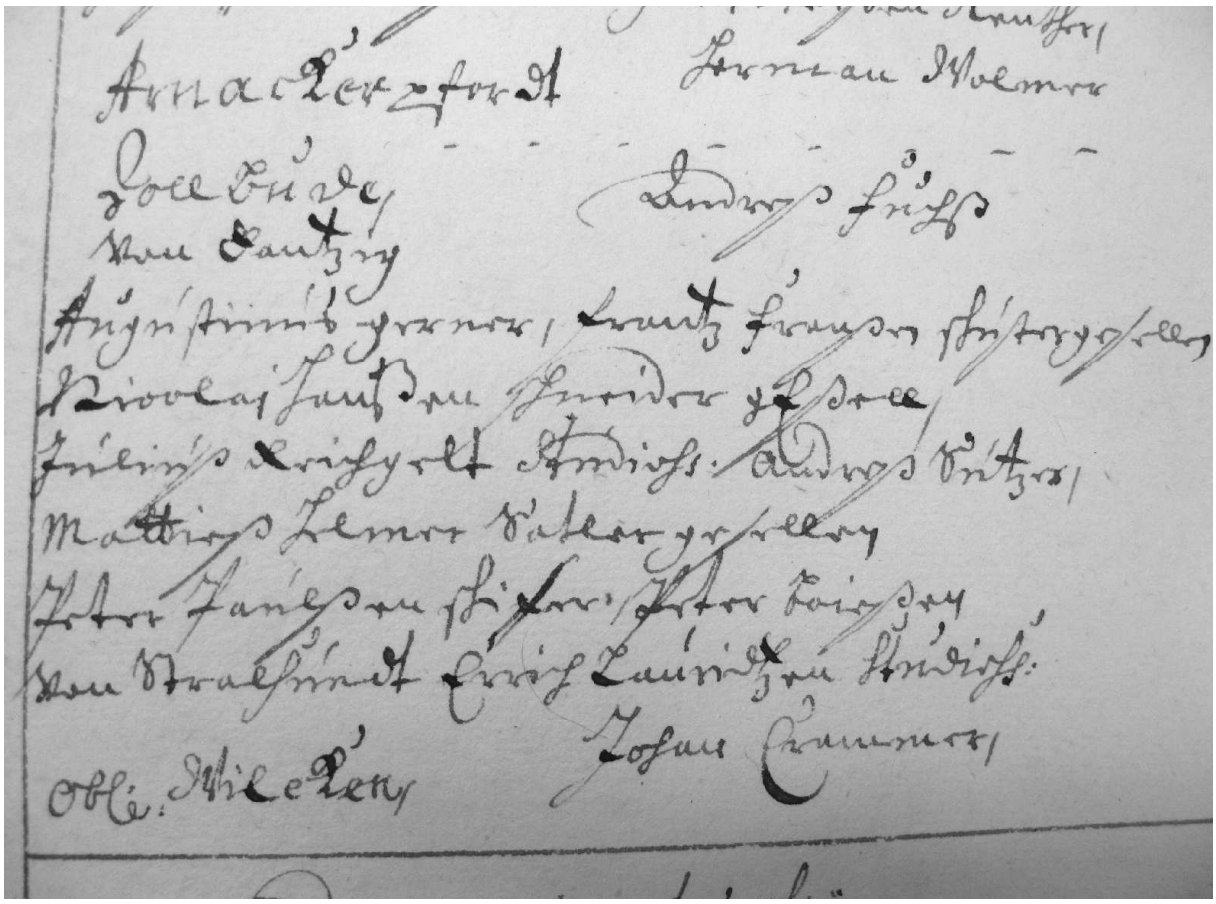

Figure 2. Excerpt from Copenhagen's customs register recording the arrival of Julius Reichelt on 12 August 1666 from Gdańsk (Forsvarets Arkiver, Garnisonsprotokol 1666, p. 642 – © Rigsarkivet, reproduced with permission).

lin described the double-refraction phenomenon. He is also known for his observations of a bright 1665 comet. Figure 3 juxtaposes a current view of the Round Tower and a representation that dates to the time of Reichelt's visit. The observatories located at the top underwent several mutations over the centuries (*e.g.*, see Gykdenkerne & Barnes Darnell 1990), but all configurations benefited from the large terrace which allowed for the observation of the whole sky and the accommodation of large instruments.

In Copenhagen, Reichelt stayed (at least for some time) with Simon Paulli, the King's physician, as mentioned in letters to Dean Balthasar Scheid[7] (DK-RB Thott 498-2), in a house at 3 Endeløsstraede since destroyed by fire. These letters also confirm Reichelt's contacts with Johannes Hevelius (1611–1687) in Gdańsk.

An excellent observer, Hevelius is seen nowadays as the founder of selenography, but he made many other contributions to the progress of as-

[7]Balthasar Scheid (Strasbourg, 1614–1670) was Rector in 1655, 1660 and 1670.

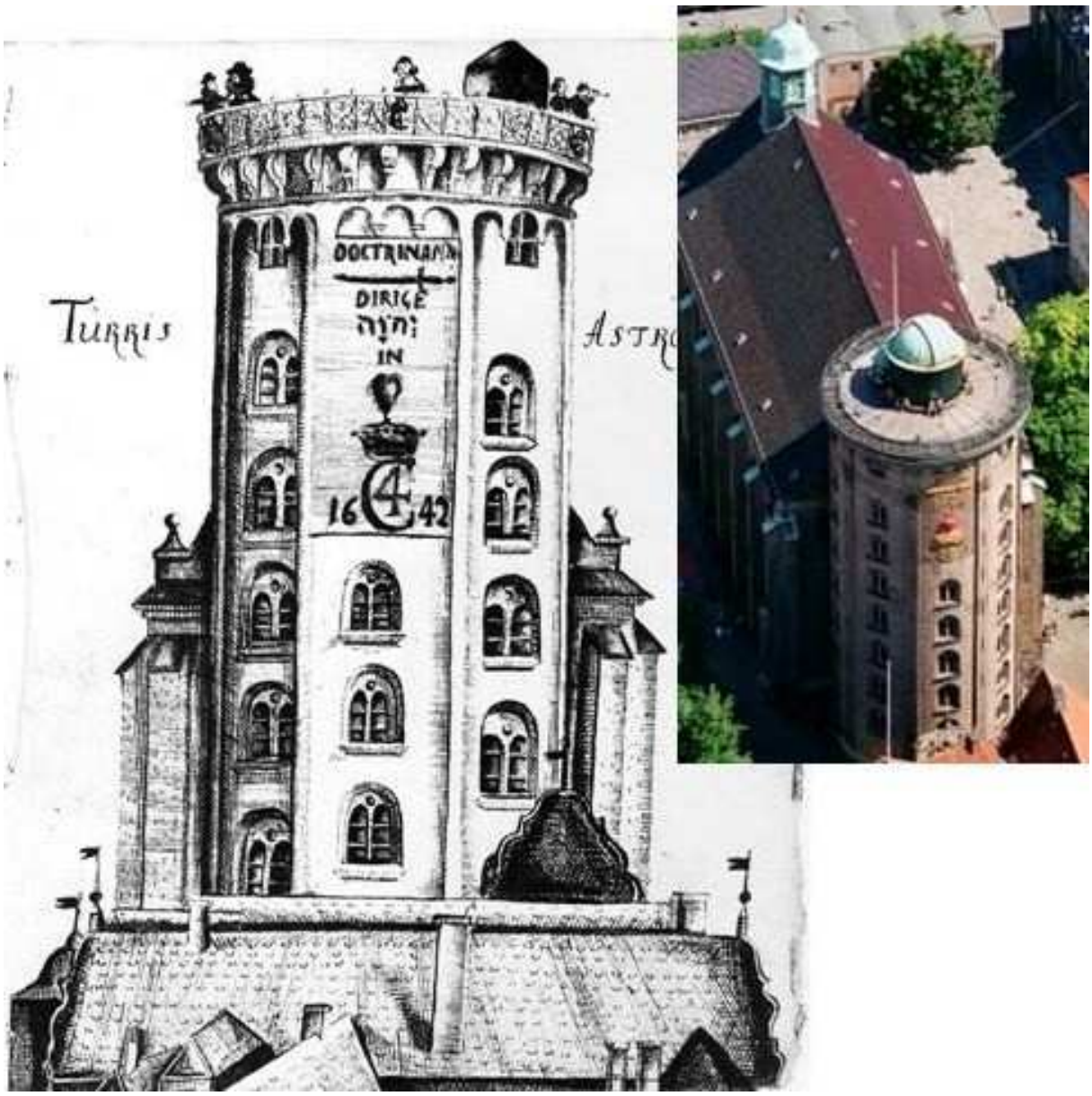

Figure 3. The *Rundetårn* (Round Tower) in Copenhagen at the time of Rasmus Bartholin and of Julius Reichelt's visit (1666), and nowadays (© Rigsarkivet, reproduced with permission, & A. Heck). The whole sky can be viewed from the large terrace that can also accommodate large-size instrumentation.

tronomy. Interestingly, he *de facto* established standards for the confirmation of discoveries of celestial objects and phenomena. While he preferred non-optical instruments (sextants, etc.) for precise astrometric measurements, Hevelius built refractors for mapping the Moon as well as for other observations. The focal lengths of those described in his book *Machina Coelestis* (1673) could reach 50 m (see Figure 4) and contained open tubes to reduce flexing and wind problems. His observatory, *Stellaeburgum*, rebuilt several times after destructive fires, was visited by monarchs as well as

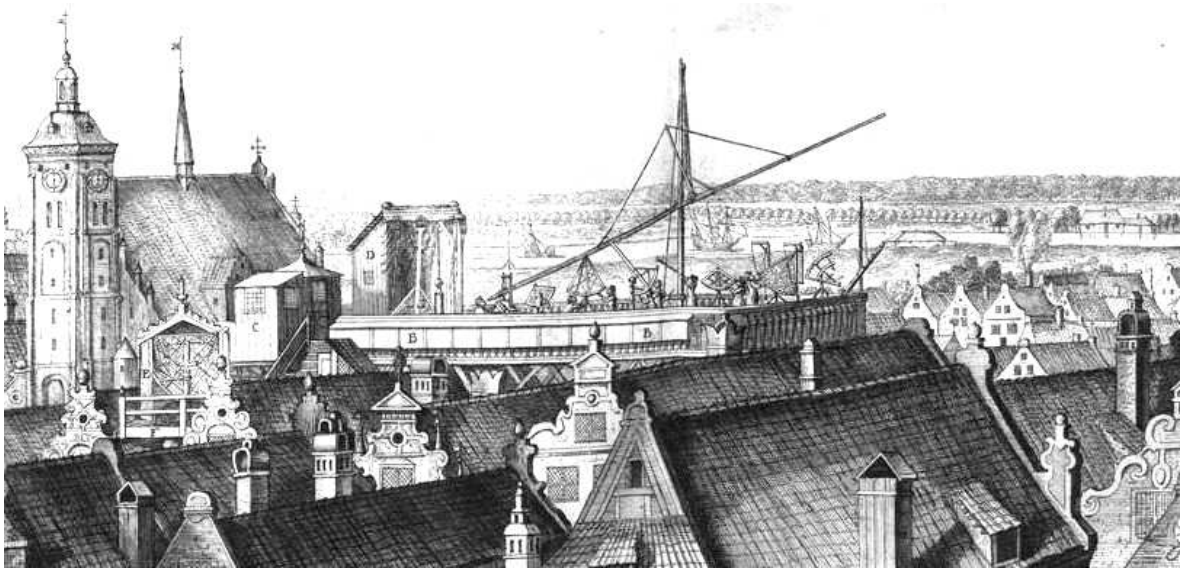

Figure 4. Example of the instruments developed by Johannes Hevelius in Gdańsk at the time of Julius Reichelt's visit and reproduced in his book *Machina Coelestis*. Here, too, the large terraces allowed the observation of the whole sky and the accommodation of large-size instrumentation.

by famous astronomers, such as Edmund Halley. In 1661 Hevelius became a member of the Royal Society. While his books include some correspondence with European astronomers, there is no trace of Julius Reichelt ...

4 Back in Strasbourg

As said above, Reichelt was nominated Professor of Mathematics in Strasbourg in 1667, after his return from Northern Europe. The measure of his teaching can be taken from the following comment by Schang & Livet (1988; my translation):

> Often, failing an available specialist, the same professor was teaching several matters, even very differing ones. In the 17th century, Reichelt, the author of a treatise of arithmeric in use at the Gymnasium until 1738, gave history courses as well as public courses of mathematics. [...] For the physicist, Aristotle's work was still the starting point, at least until the 18th century. [...] Geography did not deserve special teaching: it could be combined with the *mathesis* to which cosmography belonged. The teaching of mathematics, in spite of the emphasis given by Dasypodius,[8] remained rather elementary, at the level of the four fundamental operators of arithmetic, and, as far as geometry was concerned, at the interpretation of Euclid's

[8]Conrad Dasyposius (1531–1601) was a mathematician who is remembered mainly for his design of Strasbourg's famous astronomical clock.

> books. As to cosmography, as we could see from a perusal of school manuals, it remained faithful to Ptolemy. Copernicus was suspicious to theologians and Galileo was reeking heresy.

The first part[9] of Reichelt's booklet entitled *Elementa Astronomica & Geographica in usum Gymnasii Argentoratensis* (1688) deals with astronomy, but the chapter headings are very conservative.

Through the archives, Reichelt is later seen as lobbying for establishing a covered observatory on top of one of the city towers. An important document dated 24 May 1672 (AVCUS 4R24) records a discussion by Strasbourg's 'Small Senate' (*Conseil des XIII*), of Reichelt's proposal to erect a *specula astronomica* (astronomical observatory) on one of the towers around St Elizabeth Gate for the "... love of studying mathematics ...". Mention is repeatedly made of the money brought in by the supposedly wealthy students who should be attracted by such a facility and of the overall prestige resulting for the University.

Various members of the Senate supported the proposal, but Stettmeister Bernhold,[10] – who apparently burnt his fingers over budgetary excesses when building the *theatrum anatomicum* (anatomy amphitheatre) – insisted on setting a binding limit to the funding.

A fortnight later, on 10 June 1672, the matter went to the *Conseil des XXI*, the main City Council (AVCUS 1R155). The reputation of the city and of the university are the only arguments appearing in the records. The need for a quick decision was emphasized. It took place at the 1st of July 1672 meeting of the *Conseil des XXI* (AVCUS 1R155). After considering other towers (Goltersturm, Saint-Elizabeth Gate, both Pulvertürme, a tower near the St-Étienne bridge, ...), it was decided that the top of the inner tower of the Hospital Gate complex was most suitable for the intended structure.

But the estimated costs were thought to be too high and, after various arguments were exchanged, the facilities were scaled down and the *Verordnete Herren* only released 300 Guilders. "Come to terms with the contractors, Dear Professor." This ditty is a familiar one, and was obviously already sung at that time. The renown of the city and the reputation of the university would be safe since they would have an observatory, but it would have no terrace. At no moment, the scientific goals of the observatory nor its possible instrumental endowment seem to have been discussed.

Later on, nothing seems to have been recorded about this observatory, except here and there a maintenance request in the *Bauherren* registers. A

[9] 57 pages (out of the 142 pages of a 13 cm × 21 cm manual).

[10] Philipp Albrecht von Bernhold (or Bernold, Strasbourg 1631–1677) was *Stettmeister* i.e. the city's main magistrate, on several occasions.

list (dated 1719?) of mathematical instruments and machines constituting Reichelt's legacy (AVCUS 1AST334/12) does not include any advanced modern optical instrument. A few decades later, one of Reichelt's successors, Jean-Jérémie Brackenhoffer (1723–1789), produced quite a negative review of the equipment of the observatory including "a 16-feet focal-length astronomical refractor" virtually useless according to his description (AVCUS AA2647).[11]

In hindsight, a scientific facility can be valued for its contributions to the progress of knowledge, which can only be at its best level if the users of the facility can take advantage of an *ad hoc* instrumentation. For Strasbourg's *specula astronomica*, the emphasis put on the prestige of city and on the renown of the university, as well as economic considerations, resulted in a minimal observatory. This observing post did not take part in the spectacular developments that were occurring in European astronomy at the time and could not position itself for the subsequent phases, as much spectacular.

This is confirmed by the absence of the Hospital Gate in the compilations of astronomical contributions and advances published in reference works of the time. Lalande is the only one who makes a mention of it, and seems to rectify an oversight in his Volume 4 (1781): "Strasbourg – M. Brackenhoffer, able professor of mathematics, has there an observatory & instruments". For pleasant it might appear, that mention is little factual; it does not speak of any constructive observations; and it gives no details of the instrumentation (or even if it was operational).

5 Conclusions (or the missed opportunities)

After having reviewed, in various archives, tens of documents related to Julius Reichelt, it remains difficult to determine the exact personality of that gentleman. Although he had obviously been a gifted student, the evolution of astronomy and of the instrumentation of his time seem to have passed well over his head. No significant advance nor inventive initiative in the scientific and military realms seems to be credited to him. He indulged himself in traditional teaching, not echoing the progress he should have been witnessing – or hearing about – in astronomy. Even if his aspirations for the lantern turret of the Hospital Gate were frustrated by economic considerations, his inspiration for gaining this observatory seems to have been motivated by no scientific interest.

[11] Document dated from 1773, today unavailable from the archives. However, a transcription can be found in Lacroute (1959).

Throughout its history and its genesis, the top of the Hospital Gate can be considered as a place where astronomical observations were conducted by local scholars in charge of elementary astronomy teaching,[12] right through the beginning of the 19th century when such activities were transferred to the attic of the 'Academy' building (Heck 2011). There is, however, no evidence that the Hospital Gate observatory was the first location in Strasbourg used for astronomical observing, or that it was the only one used for that purpose at that time.

The erection of the Hospital Gate *specula astronomica* was undoubtedly due to Julius Reichelt's efforts in successfully lobbying the local authorities after his return from Northern Europe. We have seen how the *Rundetårn* (Round Tower) in Copenhagen, completed a few years before his visit, might have inspired him. On the basis of financial considerations, the Strasbourg magistrates opted for a minimal configuration, which prevented the installation of a terrace that would have enabled the observation of the whole sky, including the zenith area where the atmospheric transparency is best. The reduced space within the turret and the parcelling of windows certainly made extensive observations of the rotating sky difficult, and the size of the instruments had necessarily to remain greatly inferior to the telescopes that Reichelt had seen – or at least heard of – while in Gdańsk. In the numerous archival documents that we perused, we found no indication that Reichelt ever advocated advanced optical instruments, remaining consistent with his traditional teaching.

While decisive observational advances were taking place in other European cities at that time, the History of astronomy does not mention anything else for Strasbourg than records of celestial phenomena visible from all (comets, etc.). Our conclusion is that the Hospital Gate observatory was probably used only for rudimentary observing and for identifying bright celestial objects or phenomena relatively low on the horizon. The opportunity was therefore missed to firmly establish then Strasbourg as a center of observational astronomy. This would only happen at the end of the 19th century with the construction of the current Wilhelminian observatory (Heck 2005).

[12] There was no actual *astronomer* associated with Strasbourg universities before the creation of the current Wilhelminian Observatory at the end of the 19th century (Heck 2005).

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