Chapter V: Lorentz – Function Follows Form and Theory Leads to Experiment

I. **Dire Straits (Intro)**

By the mid- 1920s the Teyler Foundation had hit dire straits financially. At a meeting in May 1926, one of the trustees graphically summarised that money was "tighter than tight" and the Foundation's current situation "unsustainable".[1] This was not an exaggeration. In fact the situation was so serious that, at this particular meeting, the trustees began debating what should be liquidated first, should the worse come to worst: the Foundation's collection of paintings or its scientific laboratory.

As events unfolded, the trustees were not forced to make any such stark choices. For the next few decades, selling off all duplicate drawings and prints from the Foundation's collections and economising by cancelling various annual contributions to other institutions proved sufficient to keep the Foundation and all the institutions it financed – i.e. its almshouse, the Learned Societies and Teylers Museum – operating. Nevertheless, the fact that such scenarios were debated in the first place of course struck at the heart of the Foundation's identity.

The fact that the Foundation found itself in financial difficulties is all the more striking because this would have been virtually unimaginable just a few years earlier. On the eve of World War I, to an outsider at least the Foundation's resources would have seemed almost limitless. Over the preceding decades, three events in particular would have helped bolster the impression that the Foundation's trustees were a safe pair of hands where money was concerned: in 1885, the hitherto largest and lavishly decorated extension to the museum had been inaugurated; then, just eight years later and as if to prove that their resources had not been stretched to the limit, the trustees added another glamorous-looking annex to the museum – the so-called Second Art Gallery; finally, in 1912 the Foundation appointed the Nobel Prize laureate Hendrik Antoon Lorentz as curator of the Foundation's laboratory and instrument collection – a clear sign that Teylers Museum was still held in high regard in scientific circles.

Yet it was during the negotiations on Lorentz' contract that the first augurs of what was to come might already have been discernible: one trustee, Louis Paul Zocher, opposed the Nobel

[1] "Directienotulen", 14.05.1926, Haarlem, ATS, vol. 15: "De heer Tadema wijst er op dat men overal krapper dan krap zit".

Prize winner's appointment.[2] Not, he emphasised, because he doubted the physicist or that his appointment would greatly enhance the Foundation's standing, but because he had sincere doubts about the other trustees' idea to offer Lorentz more than three times the financial resources his predecessor, Elisa van der Ven, had received. Zocher was not sure the Foundation's finances could take this added strain.

He failed to persuade the other trustees that his doubts might be well-founded, however, and indeed even Zocher could not have foreseen how the world was going to change within the timeframe of just a few years and how profound an impact these changes were to have on the financial sector in general and the Foundation's finances in particular. World War I of course caused havoc – even if the Netherlands remained neutral throughout; the Russian Revolution made Russian state bonds – of which the Teyler Foundation held many – worthless overnight;[3] new taxes targeted wealthy individuals and institutions – such as the Teyler Foundation; and after the War the German economy was in the doldrums – 1923 saw hyperinflation hit the fragile Weimar Republic. Inevitably, all these factors gradually took their toll on the Teyler Foundation.

And while these financial developments had a huge impact on the overall status, scope and handling of all collections at Teylers Museum, the scientific instrument collection in particular was affected by another fundamental shift that was taking place within the world of science. More specifically, the nature of scientific research was changing: all research in the physical sciences was increasingly becoming a team effort; projects were conducted by groups of scientists, rather than individuals – as had been the case for most of the 19th century.

This, in turn, was reflected by the size of research laboratories: they were becoming increasingly large. A prime example is the research laboratory at Leiden University, where Lorentz himself had spent the largest part of his career before coming to Haarlem. Over the course of his career, Lorentz could watch as his contemporary, fellow physics professor in Leiden and fellow Nobel Prize laureate Heike Kamerlingh Onnes expanded the physics department's research facilities from a small laboratory in one wing of a building reserved for the natural sciences, into a series of rooms filling not only the entire original building, but also two equally large annexes to the first edifice.[4]

By way of contrast, the Teyler Foundation had neither the resources nor the physical space to extend its laboratory on such significant a scale. Van der Ven had been provided with new laboratory premises and they were exquisitely refurbished for Lorentz upon his arrival; Lorentz was even provided with a full-time assistant – but at heart, the Foundation's laboratory remained a one-man enterprise, thereby betraying its 18th century roots and with no means for expansion. By the time Lorentz retired – even, as we shall see, during his tenure – the laboratory had become outmoded and was therefore no longer competitive.

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[2] "Directienotulen", 10.12.1909, Haarlem, ATS, vol. 13.
[3] The worthless Russian bonds were kept in the Foundation's archives: "Coupons", c. 1917, Haarlem, ATS, vol. 2414.
[4] On this see: Dirk van Delft, *Freezing Physics: Heike Kamerlingh Onnes and the Quest for Cold*, vol. 10, History of Science and Scholarship in the Netherlands (Amsterdam: KNAW, 2007).

Yet while this somewhat sombre assessment of developments in Haarlem after World War I suggests that, by this time, the Teyler Foundation and with it Teylers Museum may have passed their prime as a nodal point of Dutch intellectual life, on another level the Foundation was enjoying unprecedented success: Teylers Museum was enjoying unprecedented acclaim as a museum for the general public. Not only did the museum's 1885 extension with its neo-classical, clearly visible entrance façade establish its status as a public institution devoted to the arts and sciences (the new entrance positively embraced the public); but by the beginning of the 20th century Teylers Museum's instrument collection was also widely recognised as harbouring great importance for the history of science.

This last point forms the overarching theme of this chapter: the way in which Teylers Museum increasingly took on a role as museum of the history of science – alongside its role as a public art museum – around the turn of the century.

As in the previous two chapters, one of the curators' of the scientific instrument collection's professional and personal biography – particularly his activities at Teylers Museum – can serve as a vantage point from which to gauge and understand the overall changes taking place in the way the museum's collections were perceived and handled. In this chapter, the spotlight is on Hendrik Antoon Lorentz.

By way of summary and to provide an idea of the timeframe this chapter will be dealing with, Lorentz was appointed to the newly created chair in theoretical physics at Leiden University in 1877, negotiations concerning his appointment as curator of the Teyler Foundation's laboratory and instrument collection commenced in 1909, he was officially employed by the Foundation as from 1912, and he held the post of curator until his death in 1928.

The emphasis here is not so much on Lorentz' biography, but on his tenure as curator in Haarlem. Particular attention will be paid to questions such as why Lorentz was approached by the trustees in the first place, why he accepted the post of curator at Teylers, what this reveals about the Foundation's self-image, and in how far Lorentz' appointment and activities during his tenure reflect his own views on the meaning and purpose of scientific research.

What's more, the period during which Lorentz was an employee of the Teyler Foundation is particularly interesting not only because this coincided with the Foundation's financial decline and the Foundation's laboratory gradually losing its status as one of the major hothouses of experimental research in the Netherlands, but also because it saw the emergence of a whole new type of museum: the museum of the history of science. Whereas Teyler Museum's status as (part) museum of the history of science had still been exceptional upon Lorentz' arrival – just a few years before, for example, it had served as a reference point for the founders of the Deutsches Museum in Munich, which is itself considered to be one of the first modern "science museums" in the world – by the time Lorentz passed away a whole range of museums devoted to the history of science were about to be founded. By the 1930s the towns of Leiden, Oxford and Florence (to name just a few) played host to such institutions.

So the spotlight is on Lorentz in this chapter; but it needs to be said that, in order to fully understand the events taking place during his tenureship both within Teylers Museum and outside Teylers Museum, one has to obtain a profound sense of the changes that had taken place over the course of the decades preceding Lorentz' arrival in Haarlem. More attention than might at first seem necessary will therefore be devoted to the final decades of the 19th century.

More specifically, the first half of this chapter focuses on events that took place before Lorentz was even asked to take up the post of curator. Firstly, an overview of the changes in the Dutch government's cultural policy will be given and a closer look will be taken at the construction of Teylers Museum's new annex. Questions such as why it was built, why its particular design was chosen, and what this reveals about the trustees' ideas on what role the museum was to fulfil, and how this is related to the policy changes taking place during the same period are addressed. Secondly, a summary of the biographies of the curators who were in charge of the scientific collections at Teylers Museum during the late 19th century, Tiberius Cornelis Winkler and Elisa van der Ven, are provided. These provide background information that allow for a better assessment – thirdly – of the full impact the new annex to the museum had on Teylers Museum's overall character. The changing way in which the scientific collections in particular were perceived is illustrated through the publication of two popular guidebooks, written by Winkler and van der Ven for a lay audience. Having identified how Teylers Museum had changed by the early 20th century, Lorentz' activities in Haarlem can then be analysed.

But first, the spotlight is on developments taking place while Lorentz was still in his 20s.

II. A New Type of Museum

1. New Government Policy in the 1870s

The 1870s saw a major overhaul of the Dutch government's cultural policy. Most importantly, instead of steadfastly following a sort of mantra that all matters pertaining to culture should essentially be left to private initiative, the government began to take responsibility for its nation's cultural heritage and became actively involved in its preservation. This of course included it becoming more involved in the running of the state's own museums, and this change of policy was therefore also most strikingly represented by the construction of a new, monumental building for the *Rijksmuseum* in Amsterdam, which was completed in 1885.

One man's name in particular is associated with these changes: that of Victor de Stuers. This nobleman from the Southern region of Brabant became something of a household name when he published an exceedingly well-written polemical article of more than 80 pages in the

journal *De Gids* in November 1873.[5] In this essay he used witty sarcasm to point out what he saw as the detrimental long-term effects of the liberal *laissez-faire* policy the Dutch government had adopted over the course of the previous decades.

Inevitably, his accusatory article contained many exaggerations – in complaining for example that the *Rijksmuseum*'s current housing at the *Trippenhuis* in Amsterdam was inadequate, he failed to mention that others before him had consistently struggled in vain to secure state funding for a new building and, instead, de Stuers described the museum's board of trustees as a group of elderly men, some of whom were so frail they were "unable to reach even the first floor" of the *Trippenhuis* for their annual meetings.[6] Yet at the same time, his main arguments were largely irrefutable.[7] De Stuers had identified something that had the potential to shame the Dutch nation, and he skilfully played this card, exclaiming for instance that he had almost felt too ashamed to admit he was Dutch when he saw a Dutch work of art on display at the South Kensington Museum.[8]

It is striking just how often the South Kensington Museum is mentioned in de Stuers' essay. It is clear that he is deeply impressed by this institution created by Henry Cole and Prince Albert. In fact the most prominent example he uses to illustrate the systematic damage caused by what he sees as ignorance of the value of the Dutch nation's cultural heritage has a link with the museum in London: de Stuers describes how the Renaissance rood screen at St John's Cathedral in 's Hertogenbosch had been dismantled for practical and aesthetic reasons – and was acquired by the South Kensington Museum, where de Stuers claims to have been utterly stunned to find it on display.[9]

There are more indications that de Stuers was impressed by what he saw in London. In a section of the article in which he praises British museum policy for instance, he mentions that "there are refreshment rooms in the buildings", even using the English term "refreshment rooms" in the Dutch text – what he presumably had in mind while writing this, is the restaurant at the South Kensington Museum.[10] Recall how this was the very first museum to include an area offering culinary refreshments.[11]

What makes de Stuers' enthusiasm for the South Kensington particularly relevant is that he clearly endorses the ideals that led to its establishment, as was described in the previous chapter. Although it has been suggested that de Stuers primarily attached importance to museums as places for professional and scientific studies[12], various passages from the 1873

[5] Victor de Stuers, "Holland op zijn smalst," *De Gids* 37, no. 4 (1873): 320–403.
[6] On the inadequacy of the caricature painted by de Stuers see: Ellinoor Bergvelt, *Pantheon der Gouden Eeuw: van Nationale Konst-Gallerij tot Rijksmuseum van Schilderijen (1798-1896)* (Zwolle: Waanders, 1998), 202. The relevant passage reads: "De Raad van Bestuur, die eens in het jaar vergadert, bestaat uit vier personen, waarvan twee door hun hoogen ouderdom (83 en 72 jaren) buiten staat zijn zelfs de eerste verdieping te bereiken." Stuers, "Holland op zijn smalst," 341.
[7] Frederik J. Duparc, *Een eeuw strijd voor Nederlands cultureel erfgoed* (The Hague: Staatsuitgeverij, 1975), 66.
[8] Stuers, "Holland op zijn smalst," 372.
[9] Ibid., 367–373.
[10] "er zijn refreshment rooms in de gebouwen aanwezig"; Ibid., 341.
[11] See the previous chapter or: Krzysztof Pomian, "The South Kensington Museum: A Turning Point," in *Art and Design for All: The Victoria and Albert Museum* (London: V&A Publishing, 2011), 42.
[12] Duparc, *Een eeuw strijd voor Nederlands cultureel erfgoed*, 67.

essay make clear that he would have agreed fully with Henry Cole's idea that museums should have a civilizing, educational function, while also helping bolster the nation's economy. As de Stuers puts it himself, previous Dutch governments had not understood

"that museums are one of the most indispensable and most powerful driving forces for the development of the people, for the promotion of art and industry, and finally for the increase of general prosperity."[13]

A few pages earlier he had left no doubt about the fact that he thought the fine arts could have a civilizing effect, saying:

"we shall not dwell for long upon the beneficial influence that the pursuit of the fine arts will have on the general refinement and development of the people."[14]

And the nobleman de Stuers also clearly stated that he thought museums could have a civilizing effect on the uneducated, lower classes – again echoing Cole's sentiments when he laments that Dutch museums are not open as long as their British counterparts. De Stuers proposes opening all museums on Sundays:

"On Sundays, I think, access should be made available as widely as possible. Lower-class people, unfortunately, don't know what to do with their leisure time, and it would be a highly moral endeavour to give them the opportunity to uplift their hearts and minds when they see the splendid products of the Creator and of men."[15]

Crucially, De Stuers found himself able to actively work towards the implementation of these ideals in the Netherlands when, less than two years after he published his famous essay, a new department of the arts and sciences was set up at the Dutch ministry of the interior (*Afdeling Kunsten en Wetenschappen*) and none other than de Stuers himself was instated as the head of this new department and was awarded the rank of senior civil servant. He was 31 years old at the time, and remained on in this position for more than a quarter of a century, until he was placed on "non-active" status when he was elected a member of the Dutch parliament for the town of Weert and its surrounding regions in the Southern Netherlands.[16]

Through this position and his skills at playing the state bureaucracy, he was able to exert huge influence over the government's handling of cultural matters. To name just some of the most important examples: he was intricately involved in the establishment of the *Rijksmuseum* at its new building and its overall acquisition policy;[17] he helped ensure that – for the first time in

[13] "dat de musea een der meest onontbeerlijke en der krachtigste hefboomen zijn tot ontwikkeling van het volk, tot bevordering der kunst en der industrie, en ten slotte tot verhooging van de algemeene welvaart." Stuers, "Holland op zijn smalst," 337.
[14] "Wij zullen niet lang stilstaan bij den gunstigen invloed dien de algemeene beschaving en ontwikkeling van het volk ondervinden door de beoefening der schoone kunsten." Ibid., 322–323.
[15] "Op Zondag zoude het - dunkt mij - zaak zijn de toegangen zoo wijd mogelijk open te stellen. De mindere man weet helaas dan met zijn ledigen tijd geen raad, en men zou een zeer moreel werk verrichten wanneer men hem in de gelegenheid stelde zijn hart en zijn geest te verheffen bij het zien van de heerlijke voortbrengselen van den Schepper of van de menschen." Ibid., 338.
[16] Duparc, *Een eeuw strijd voor Nederlands cultureel erfgoed*, 6–7 & 16.
[17] For examples of his involvement see: Bergvelt, *Pantheon der Gouden Eeuw: van Nationale Konst-Gallerij tot Rijksmuseum van Schilderijen (1798-1896)*, 223–224.

decades – funds were made available for a better upkeep of state museums' collections and new acquisitions once again became possible;[18] he lobbied for trade restrictions on artefacts deemed to be of heritage value so that they could not be exported so easily;[19] and he took the initiative to establish the "Rembrandt Club" (*Vereniging Rembrandt*), which could provide museums with interest-free loans to acquire items for their collection which exceeded their annual budget.[20]

A measure of the extent to which his ideas on cultural policy caught on, is the gradual expansion of "his" department: when de Stuers arrived he had funding for one assistant, but by the time he left the department consisted of five people, including its head.[21] So he had evidently also succeeded in having his ideals engrained within the bureaucratic apparatus of Dutch government.

At this point it has to be said that Victor de Stuers of course did not perform the Herculean task of changing an entire government's decade-long policy entirely on his own. There can be no doubt about the profundity of his influence, but it is also important to realise that he would never have been able to effect so many changes if there had not been some sort of wider consensus on the validity of his ideas and efforts.

That de Stuers was not some kind of lone warrior, but more of a figurehead of a far broader movement, is in turn important to keep in mind when assessing what was happening at Teylers Museum in 1870s and 1880s. More specifically, it provides the backdrop against which the construction of the new annex to the museum during these years needs to be seen.

2. The New Annex to Teylers Museum

As with all the other sections of the museum building, frustratingly little archival material that could throw some light on both the reasons for its construction and the process thereof, has been preserved in the Foundation's archives. According to the minutes of the trustees' meetings, the first time they discussed a possible expansion of the museum premises was in February 1877.[22] Yet by this time they had already acquired three neighbouring houses, which would eventually be torn down to make way for the new extension. It is unlikely that the possibility of enlarging the museum would not have been discussed during the acquisition process of these properties, i.e. before February 1877.

Be that as it may, by the beginning of 1877 the trustees clearly agreed on the fact that a new wing should be added to the museum building. No details as to why this decision was taken

[18] Duparc, *Een eeuw strijd voor Nederlands cultureel erfgoed*, 146.
[19] Ibid., 14–16.
[20] Ibid., 8.
[21] Ibid., 16.
[22] T. van Gestel and A.W. Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," in *"Teyler" 1778-1978* (Haarlem; Antwerpen: Schuyt, 1978), 224.

are provided in the relevant meetings' minutes, but a handwritten, nine-page account of the construction of the annex, which was compiled after the building works had been completed in 1885, gives two plausible reasons. The first was that the trustees wanted to commemorate the hundredth anniversary of the Teyler Foundation's establishment in 1778, the second is that the museum was bursting at the seams. The relevant passage in the account itself reads as follows:

"Many problems had already arisen, because for many years a need had been felt for more space; the physics cabinet was too small; by purchasing many books and particularly through the acquisition of a large number of Journals as a result of exchange, the space in the library had become too restricted; the palaeontological Cabinet became too small due to the many acquisitions, and in particular there was a need 1^0 for a large auditorium for lectures, which are usually held in winter, 2^0 for a room for meetings to examine works of art [*kunstbeschouwingen*] and where drawings (or something else) can be permanently exhibited."[23]

In March 1877 an architectural competition for designs for the new annex was announced in various newspapers.[24] By September of that year 18 architects had submitted plans. They were required to do so anonymously, and their plans had to meet a fairly long list of requirements. The trustees had even provided a basic sketch of the arrangement of the various sections of the building, which the architects were not to deviate from. The building was to consist of two storeys, with room for an auditorium and library space on the upper floor, and three large rooms on the ground floor, for the palaeontological collection and the scientific instrument collection. Other requirements included an office for the museum's caretaker, fire precautions, and an entrance area with some sort of monumental staircase leading to the first floor.

The construction of a new entrance area became possible because the private houses that had been acquired to make room for the new museum building faced out onto one of the four roads surrounding the block of houses that Teyler's old town house formed a part of. Recall how Pieter Teyler had stipulated that his town house was never to be demolished, and how the original museum building, the Oval Room, had been constructed behind this town house and was only accessible through Teyler's former abode. Ever since the 1780s, Teyler's former front door had been the – accordingly inconspicuous – entrance to Teylers Museum.

With the acquisition of the extra properties, however, it had become possible to create a new access route to the museum. What's more, these properties opened out onto a different road than the one Teyler's former house was on – they opened out onto "the Spaarne", one of

[23] "Er hadden reeds vele bezwaren opgedaan, want sedert vele jaren deed zich meer en meer de behoefte gevoelen aan meerdere ruimte; het physische kabinet was te klein; door den aankoop van vele boeken en vooral door het aanschaffen van een groote aantal Tijdschriften ten gevolge van den ruilhandel werd de ruimte op de bibliotheek te gering; het paleontologische Kabinet werd door de vele aankooen te beperkt, en vooral deed er zich eene behoefte gevoelen 1^0 aan een groote auditorium voor de lezingen, welke gewoonlijk 's winters plaats hebben, 2^0 aan een lokaal voor kunstbeschouwingen en waar voortdurend teekeningen (of iets anders) tentoongesteld zouden kunnen worden." "Teyler's Fundatie te Haarlem", 1867-c.1887, ATS, vol. 78, fol. 199.
[24] For the following information on this competition see: Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 226–228.

Haarlem's main canals. This meant that the museum premises would become accessible from two sides. The entire conglomerate of museum buildings – Teyler's old town house, the Oval Room, the First Art Gallery and the newest annex – now sort of snaked their way through the block of houses of which Teyler's own house formed a part. Crucially, as a result, it now became possible to render the inconspicuous access route through Teyler's old house a back entrance rather than the main entrance, by constructing a second, purpose-built entrance on "the other side" of the complex of buildings.

It seems that – in architectural terms – the mastermind behind these plans was the trustee L.P. Zocher, who was himself an accomplished architect. Over the course of his career he was involved in designing a number of mansions in Haarlem, some of them together with his even better known father, Jan David Zocher.[25] At any rate it was the younger Zocher who drew up the detailed requirements the entrants to the architectural competition were provided with.[26] It is plausible that in drawing up the plans for the competition he might also have consulted another architect, Jacob Ernst van den Arend, who at this point was working part-time for Teylers Museum as caretaker of its buildings. In 1862 van den Arend had designed Haarlem's town museum in the town house (*Stadhuis*), where the paintings by Frans Hals that were owned by the municipality were put on display.[27] So he was no stranger to designing exhibition areas. Furthermore, he cooperated with Zocher on at least one project in Haarlem.[28] And in the early 1890s, van den Arend designed the next extension to Teylers Museum, the so-called Second Art Gallery, adjacent to the First Art Gallery.[29]

Ultimately, the amount of detail provided by the trustees meant that the only part left entirely to the architects' imagination was the entrance façade facing the street, i.e. the entrance area to the building. The trustees stated somewhat ominously that "[t]he façade facing the Spaarne must, as the main entrance, be worthy of the [Teyler] foundation".[30]

This implies that they were well aware just how important this part of the building was going to be – as, indeed, does the unfolding of subsequent events.[31] Because, in a nutshell, all the trustees retained from the architectural competition was the design of the museum's entrance façade. They decided not to award any of the entrants the full prize money, but did single out two designs and offered the author of one of them – the comparatively young architect Christian Ulrich from Vienna – the sum of f5000,- to be allowed to use his design for the entrance façade. Ulrich agreed and provided numerous depictions of possible slight variations to his original design, along with a detailed scale model of the museum's entrance area as he wanted to build it. Zocher even travelled to Vienna to pick up this model and discuss Ulrich's plans in person in February 1879.

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[25] See: Wim de Wagt and Jos Fielmich, *Architectuurgids Haarlem* (Rotterdam: Uitgeverij 010, 2005), 77 & 89.
[26] Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 227.
[27] Saskia Groot Koerkamp, "Teylers Tweede Schilderijenzaal: Mee Met de Tijd" (bachelor thesis, Utrecht University, 2011).
[28] Wagt and Fielmich, *Architectuurgids Haarlem*, 80.
[29] Koerkamp, "Teylers Tweede Schilderijenzaal: Mee Met de Tijd."
[30] "De gevel aan het Spaarne moet, als hoofdingang, der stichting waardig zijn"; as quoted in: Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 228.
[31] The following account is based on the information provided in: Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)."

Fig.8. The entrance to Teylers Museum after 1885
(Teylers Museum, Haarlem, AN159)

The museum's façade was subsequently built in accordance with Ulrich's design. Yet Ulrich himself was never involved in the actual implementation of his ideas. In fact, he never appears to have set foot in Haarlem. The trustees had decided to appoint a Dutch architect to oversee the construction of the new annex. Why exactly they decided not to employ Ulrich is not clear. For one, it was certainly more practical to have a "local", i.e. Dutch architect in charge of the building work. But at the same time, the decision implies that the trustees attached particular importance to the entrance façade, simply because they seem to have gone to greater lengths to ensure its high quality than they did with other parts of the building.

At first they had entrusted the Amsterdam architect Jan L. Springer with overseeing the construction of the new wing to the museum, but when he failed to meet various deadlines the trustees decided to part ways with him. In May 1878 they replaced Springer with A. van der Steur jr., whom Zocher had worked with on a number of projects himself (and whose surname is perhaps confusingly similar to that of Victor de Stuers).[32] Van der Steur was ultimately responsible for the design and the construction of the entire remainder of the new building, although some of the art work or the mezzanine floor was produced by experts from as far away as Frankfurt am Main. With regard to the arrangement of the building, van der Steur essentially adhered to Zocher's plans, as they had been presented in the announcement of the architectural competition for the new annex. As far as the aesthetics of the building –

[32] Wagt and Fielmich, *Architectuurgids Haarlem*, 77 & 82.

particularly those of the interior – were concerned, he seems to have used Ulrich's design of the entrance façade as a reference point. This was in fact already noted by the first journalist who is known to have published an extensive description of the new museum premises once they had been completed, and again highlights how important the entrance façade was.[33]

With the planning phase largely completed, in November 1879 the cornerstone to the new museum premises was laid by the president of the Teyler Foundation's trustees, van der Vlugt, during a small ceremony to mark the occasion. Inevitably, the construction work suffered a few setbacks over the course of the following months and years – soon after building had commenced, an unexpected bout of frost damaged the groundwork for instance, or in October 1880 parts of the entrance façade crashed to the ground.[34] In the overall scheme of things however, these setbacks remained minor in scale, and building work commenced rapidly. In January 1885, the new annex was ready to be used. The author of the hand-written account from which was already quoted above summarised:

"On Sunday, 18 January 1885, the new rooms of the Museums were opened for many invited guests, the master builders and the architect, and on 26, 27 & 28 January many interested persons and accompanying ladies were admitted so that they could inspect [the new premises].[35]

One of the tickets required by the general public to enter the museum during these three days has been preserved in the museum archives, and reveals that the building was accessible between 11am and 3pm.[36] The auditorium had already been inaugurated with a public lecture by the curator of physics Elisa van der Ven on January 23rd, but the collections had not been transferred to the new building yet. The curators soon began to do so, though, and the exhibition area was largely furbished by the summer of 1885.[37]

3. Awe my Guard

The impact of its new premises on the overall character of the museum can hardly be overestimated. It is not just that the museum roughly doubled in size; what was even more striking about the new building and, at the same time, reveals much about how the trustees

[33] J. Craandijk, "Pieter Teyler van der Hulst en zijne Stichting te Haarlem," *Eigen Haard* 11 (1885): 118. Van Gestel and Reinink clearly confirmed this on the basis of their own research: Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 284.
[34] On the problems caused by frost see: Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 253. On the setback building the façade see: "Teyler's Fundatie te Haarlem", 1867-c.1887, ATS, vol. 78, fol. 202.
[35] "Op Zondag, 18 Januari 1885, werden de nieuwe localen der Musea voor vele genoodigden, de bouwmeesters en den architect opengesteld, en den 26, 27 & 28 Januari werd aan vele belangstellenden met hunne dames ook de toegang verlend om deze in oogenschouw te nemen." "Teyler's Fundatie te Haarlem", 1867-c.1887, ATS, vol. 78, fol. 206.
[36] The ticket can be found in: "Teyler's Fundatie te Haarlem", 1867-c.1887, ATS, vol. 78.
[37] "Teyler's Fundatie te Haarlem", 1867-c.1887, ATS, vol. 78, fol. 206-207.

saw the museum's overall role at this point in history, is the entrance façade that was constructed as part of the new annex.

It has already been pointed out that the trustees were clearly aware of the symbolism of constructing a new entrance. The fact that they realised just how much of an effect the entrance area in itself would have on the entire museum and particularly how it was perceived, is reflected by the pivotal role the façade was accorded throughout the process of designing the Foundation's newest building. It has also been pointed out how strongly the new entrance contrasted with the old way of access to Teylers Museum, i.e. through Teyler's old town house. In other words, the fact that the museum was provided with a specifically designed entrance area in itself already marks a turning point in the museum's history and, as was already mentioned in previous chapters, was clearly reflected by a significant increase in visitor numbers. The records indicate that attendance increased about fourfold, increasing to about 3000 annually after 1885.[38]

But what still deserves a little more attention is the design of the entrance façade itself, already because the trustees' architectural preferences reveal a little about their own self-image, or rather how they saw the museum.

It has been suggested that Ulrich was strongly influenced by the design of the *Neue Hofburg* in Vienna.[39] Intriguingly, Gottfried Semper had been involved in the construction of this Viennese building – recall how it was Semper who drew up the plans for "Albertopolis" in South Kensington, as described in the previous chapter. But whatever Ulrich's sources of inspiration, what is particularly striking is the monumentality of his design. The façade has been described as representing a form of "neo-classical baroque", although the 19th century journalist referred to above described the building as being held in an "Italian Renaissance" style.[40] The museum's towering entrance doors, the ionic columns that frame them, the steps one has to walk up to reach the entrance, and the group of three statues on the roof of the building that resemble ancient goddesses and represent "Fame" crowning "art" and "science" with laurel wreaths – these are just some of the features that ensure the museum stands out amongst the adjacent Dutch town houses from the 18th century.

The neo-classical, monumental style the museum was held in not only ensured none of the passers-by could miss it; it also guaranteed that it was recognisable as a cultural institution. It was clearly in accordance with the temple-like designs the general public would by this time have come to expect from public centres of "high culture" such as theatres, opera houses, or museums. Much the same can be said of the interior: having passed through the entrance doors, visitors entered a small rotunda, with a marble floor, antique-looking statues representing various branches of knowledge set in alcoves, and with plaster reliefs allegorising various branches of the arts and sciences lining the walls. Exaggerating only a little, it was as if they had entered a place of worship for the arts and sciences.

[38] This assessment is based on the amount of signatures in the visitor's books and the total amount of visitors provided in the art curator's annual reports after 1885.
[39] Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 284.
[40] Ibid.

So while the trustees clearly wanted to attract more visitors, i.e. let more people profit from the collections they had acquired with Pieter Teyler's bequeathal by making them more easily accessible, any visitors were evidently also supposed to be instilled with a sense of awe and respect, presumably both for the Foundation's work (recall how the instructions to the architectural competition had stated the entrance had to be "worthy of the foundation") and for science and the fine arts in general. On the one hand this was neither new nor surprising – after all, the century-old Oval Room had had a similar effect and purpose. But there is another dimension to this, too: within the context of the times and the increasingly mainstream idea that museums had an educational and "civilising" function, it is particularly significant that the entire design of the new museum elicited a sense of reverence. After all, awe and respect in turn elicit good behaviour and, as was described in the previous chapter, to a major extent museums' "civilising" function lay in providing a benchmark as to what constituted appropriate behaviour in public, or rather good behaviour according to bourgeois norms.

As if to underscore this, as soon as the new annex to Teylers Museum opened to the public and for the first time in the history of their museum, the trustees employed professional guards to ensure the collections on display remained unharmed and visitors acted appropriately. The first paragraph of the guards' job description read:

"The guards are tasked with guarding the items on display, ensuring compliance with the regulations and policing the premises. […] When the need arises they will assist the caretaker in his work."[41]

It is not clear how many guards were present simultaneously, but the general job description certainly refers to "guards" that were to assist the museum's main caretaker (*concierge*), i.e. not just to one guard.

One can safely assume that the idea to take on guards to "police" the museum was largely down to practical reasons – after the completion of the new annex the museum was not only far larger than before but would also be frequented by far more visitors, so the likelihood of damage to the collection had quite simply increased significantly. Yet at the same time – consciously or not – the mere presence of guards would have demonstrated to every visitor that he (or she) was obliged to behave appropriately, i.e. abide by the rules of public conduct and this, in turn, would have served to turn a visit to Teylers Museum at least in part into an "exercise in civics", to use Tony Bennett's term.[42] Like many other public museums, Teylers Museum was increasingly acquiring a "civilising" role. Indeed, the general guidelines the caretaker and the guards were provided with clearly implied that a sense of public decency was required by all visitors: not only was it forbidden to bring walking sticks or umbrellas to the exhibition area for fear they might cause damage to the objects on display, but the

[41] "Aan de opzichters is opgedragen de tentoongestelde voorwerpen te bewaken, de naleving der reglementen te handhaven en de politie in de localen uitteoefenen. [...] Zij zijn desgevraagd den concierge in zijn dienst behulpzaam." "Instructies Opzichters Museum", 1884, Haarlem, ATS, vol. 116.
[42] Tony Bennett, *The Birth of the Museum: History, Theory, Politics* (London; New York: Routledge, 1995), 102.

caretaker was also explicitly allowed "to refuse admittance to shabbily dressed persons and persons under the influence of liquor".[43]

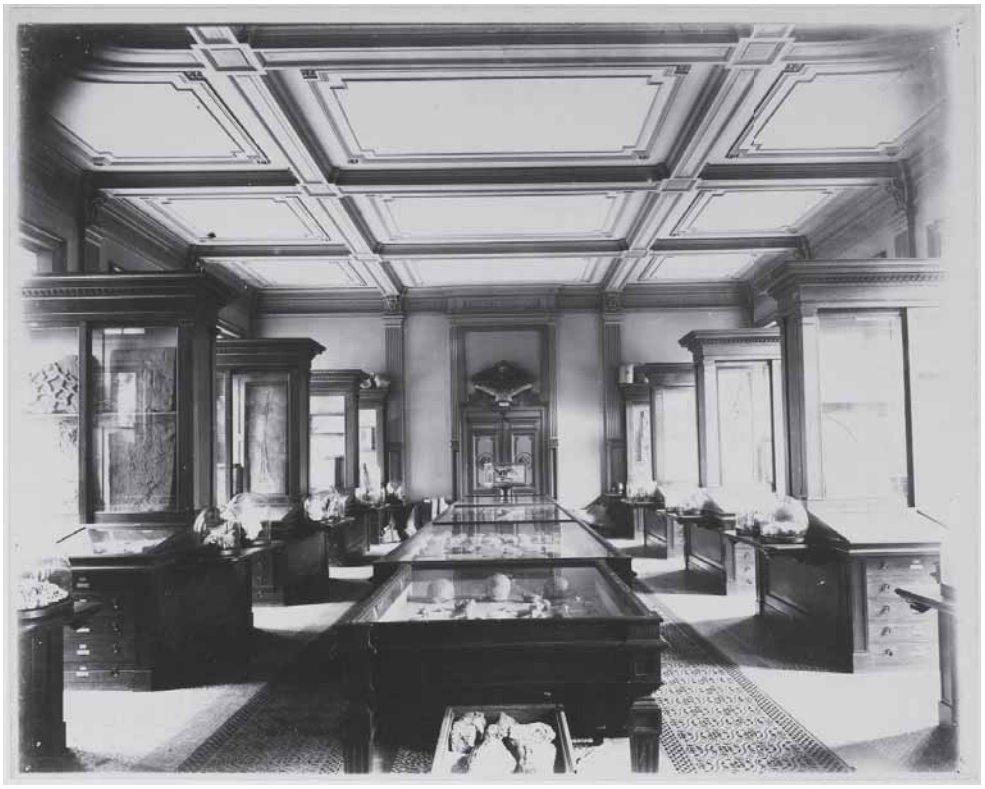

Fig.9. One of the rooms for palaeontological and mineralogical collections in the new annex to Teylers Museum, after 1885 (Teylers Museum, Haarlem, AF608)

4. What a Coincidence

This idea of Teylers Museum as something of a purveyor of public mores brings us back to the ideals espoused by Victor de Stuers in Amsterdam. One could perhaps say that both de Stuers and the trustees were riding the crest of a wave of general opinion on the overall role of museums that had its origins in South Kensington and was now sweeping the Netherlands. What is particularly striking in this respect is the fact that the new *Rijksmuseum* in Amsterdam – the most tangible result of de Stuers' and his allies' lobbying the government for more funds for the preservation of Dutch cultural heritage – and the extension to Teylers Museum were both completed in the very same year, in 1885. (Although, to be precise, it should be added

[43] "haveloos gekleede personen en personen in kennelijken staat van dronkenschap den toegang te weigeren"; "Instructies Opzichters Museum", 1884, Haarlem, ATS, vol. 116.

that only the section of the *Rijksmuseum* that contained its collection of paintings was opened to the public in that year, whereas the section with historical items took another two years to furbish. In the overall scheme of things, that is still remarkable close to the opening in Haarlem.) The question then arises in how far this was pure coincidence.

Although the coincidence is striking, great caution is called for here and one should not jump to any conclusions. More to the point, it would be far too simple to portray what was happening in Haarlem merely as an attempt at emulating de Stuers. For one, the trustees of the Teyler Foundation had too many good reasons of their own for constructing the new annex to Teylers Museum when they did. The establishment of the Teyler Foundation in 1778 – the event the trustees intended to celebrate with the new annex – had obviously not been planned to coincide with de Stuers' activities, for instance. What's more, there is no direct evidence of events in Amsterdam having had any impact whatsoever on the decision making process in Haarlem. Neither de Stuers nor the *Rijksmuseum* are mentioned in any of the documents pertaining to the construction of the extension to Teylers Museum.

But at the same time there is clear evidence that at least some of those involved in the various aspects of expanding Teylers Museum were well-informed about what was happening in Amsterdam, both with regard to the new building for the *Rijksmuseum* and with regard to de Stuers' attempts at securing a more high-profile involvement of the government in cultural matters. It is another matter to determine just how much of an impact – if any – this knowledge of issues that were being discussed in Amsterdam and The Hague had on what was decided in Haarlem, but it does underscore that it wouldn't suffice to see the construction of the new annex to Teylers Museum as having occurred in total isolation from other developments in the museum world.

The three individuals that would have most definitely been privy to information concerning de Stuers' activities were: Johannes Enschedé, a member of Teylers Second Society, Hendrik Jacobus Scholten, curator of Teylers Museum's collections of fine art since 1872, and – albeit to a lesser extent than the other two – the trustee L.P. Zocher.

Enschedé and Scholten were members of a committee that can be seen as the kernel of the cultural ideals so vociferously propagated by de Stuers in the Netherlands.[44] It will not come as much of a surprise that de Stuers was himself a member of this committee and in fact dominated it during the brief period of its existence between 1874 and 1879. The overall amount of members varied, but was never more than ten.

Some background information on this committee is necessary in order to be able to assess the implications of Enschedé's and Scholten's membership. The committee was founded a few months after de Stuers had published his famous article in *De Gids*, although its establishment had already been discussed prior to the article's publication. Its task was to advise the department of education and arts and sciences at the Dutch interior ministry. Technically, this department was the predecessor to the department of arts and sciences that de Stuers was

[44] For the following information on this committee see: Duparc, *Een eeuw strijd voor Nederlands cultureel erfgoed*, 2–13 & 71–78.

appointed to in 1875 – however, the former essentially consisted of just one man (Hendrik Vollenhoven) and even though he was provided with three assistants, he focused almost exclusively on matters pertaining to education. So de Stuers' department was fundamentally different from the one it replaced.[45]

The committee did a lot to create awareness for issues concerning Dutch cultural heritage. Without the committee, de Stuers' department at the interior ministry might never have been created. What's more, along with Enschedé and Scholten the committee included some other prominent members – the architect of the new *Rijksmuseum*, Pierre Cuypers, was one of them for instance. Yet throughout its existence the committee's position was an awkward one. At first, because nine high-profile intellectuals were advising a civil servant – the head of the department for education and arts and sciences – who wasn't really interested in issues pertaining to the area they were advising him on. And then, after this civil servant was replaced by Stuers (who of course was anything but disinterested in issues surrounding Dutch heritage) in 1875, the committee's position remained awkward simply because de Stuers refused to resign from the committee, even though he did step down as secretary to the committee. As a result, de Stuers was essentially advising himself, and the committee's role was in danger of being reduced to rubber stamping de Stuers' policies. Finally, by 1879, major disagreements amongst its members had made the committee unable to function and it was officially dissolved by March 1879.[46]

Let us return to Enschedé and Scholten: Enschedé was one of the first eight members appointed to the committee, and as such would have participated in the more than 50 meetings that were called over the course of the committee's existence. One can assume that at least part of what he learnt during these meetings would have found its way to Haarlem, i.e. that he would have shared information with his friends and colleagues at home. Scholten only joined the committee some years later, in 1877. Nevertheless, the fact that he was appointed a member at all indicates that he was generally recognised within those circles that were pushing for reform of the Dutch government's approach to its nation's cultural heritage.

Zocher, finally, was involved in at least one project that Cuypers was involved in as well.[47] As a well-established architect working in the same geographical region of the Netherlands, it is plausible that Zocher would have at the very least heard rumours of what Cuypers was working on.

As was already said, these connections do not provide direct proof that the construction of new museum premises in Amsterdam and Haarlem were in any way connected. But they do underscore the notion that both can be seen as the manifestation of a fundamental change of attitude towards the role of museums in the Netherlands that was taking place at the end of the 1870s.

That the implications of these changes, or rather of a new role for museums as state-sponsored "exercises in civics", were both generally recognised and also taken very seriously becomes

[45] Ibid., 1–2.
[46] Ibid., 12–13.
[47] Wagt and Fielmich, *Architectuurgids Haarlem*, 82.

clear if one takes a closer look at the reason why the advisory committee Enschedé and Scholten sat on was dissolved[48]: in the late 1870s de Stuers and Cuypers saw themselves accused of trying to promote Roman-Catholicism through the mediaeval, neo-Gothic, "old-Dutch" style in which they had apparently decided to fashion all public buildings they were responsible for, including of course the new *Rijksmuseum*. De Stuers even felt compelled to publish an essay rejecting these accusations, but this just elicited a retaliatory article from none other than a fellow member of the advisory committee, Carel Vosmaer. Although Vosmaer had published his rebuke – in which he reiterated that de Stuers and his allies were trying to use their promotion of Dutch cultural heritage to help convert the Protestant majority of Dutch Christians to Roman-Catholicism – under a pseudonym, it appears to have been clear to all involved who the real author was. A sharp exchange of opinions ensued during the next meeting of the advisory committee, with Vosmaer and two other members subsequently resigning.

At the time, fundamental debates on the role Catholics were to take within a secular society were raging in the Netherlands.[49] One strand of Catholicism in particular, referred to as ultramontanism and which placed a strong emphasis on the Pope's absolute authority, was perceived as a threat by many Protestants in the Netherlands and served to heighten a widely held and age-old sense of distrust of all forms of Christianity that were not sanctioned by the Reformed Church. (Recall how Mennonites such as Teyler, while not in any way restricted in practising their faith, had not been able to take on public office.) The reason ultramontanism was perceived as such a threat was that it seemed to undermine the state's authority. Rather than pledge allegiance to the Dutch nation, Catholics were being asked to pledge allegiance to the Pope, residing "beyond the mountains". At a time when a strong sense of nationhood was merging amongst Dutch Liberals, this formed a particularly sensitive dilemma.

These issues largely came to the fore in debates concerning the organisation of the Dutch educational system, with Dutch bishops at one point declaring their followers should not to send their children to state-run schools.[50] Yet, even if Vosmaer's and de Stuers' discussions were merely a side show within a series of more prominent debates, the fact that these debates revolved around educational matters shows how museums were accorded an influential and formative role, precisely as educational institutions, by the late 1870s.

One final aspect about the dispute that led to the dissolution of the advisory committee that is intriguing is the fact that Scholten took sides with Vosmaer. The curator of Teylers Museum's art collection did not resign from the committee, but clearly had his misgivings about the neo-Gothic style Cuypers had chosen for the new *Rijksmuseum*. Was this perhaps a more widely held sentiment amongst those associated with the Teyler Foundation, reflecting its Mennonite roots? And if so, was this perhaps one of the reasons for choosing such a blatantly monumental neo-classical design theme for the Foundation's own museum? This was, after

[48] The following summary of the dispute leading to the advisory committee's dissolution is based on information provided in: Duparc, *Een eeuw strijd voor Nederlands cultureel erfgoed*, 11; Jos Perry, *Ons fatsoen als natie: Victor de Stuers, 1843-1916* (Amsterdam: SUN, 2004), 119–138.
[49] On this see for example: R.A.M. Aerts et al., *Land van kleine gebaren: een politieke geschiedenis van Nederland 1780-1990* (Nijmegen: SUN, 2010), 116–127.
[50] Ibid., 123.

all, a conscious choice, given that the trustees had a total of 18 designs to chose from, following the architectural competition they held. Unfortunately, at least from a historian's point of view, all proposals except the winning one submitted by Ulrich were destroyed or returned to their authors once Ulrich's had been singled out as the best. Just two others have been partially preserved, seemingly by accident – and they are not enough to draw any far-reaching conclusions from.[51] So, given that the available evidence on any possible influence of ultramontanist thought on the design of Teylers Museum is purely circumstantial, any statement concerning this matter would have to remain largely speculative.

However, what is indisputable is the huge impact the extension to Teylers Museum had, not just on the overall character of the museum as was described above, but also on the specific handling and presentation of the museum's collections. Before focusing on how the new building affected the scientific collections, however, it is worth learning a little more about the curators that were in charge of these collections at the time of the construction of the new annex.

III. T.C. Winkler & E. van der Ven

1. Tiberius Cornelis Winkler

During the years in which the new annex was added to Teylers Museum, Tiberius Cornelis Winkler was in charge of the museum's geological collections and Elisa van der Ven was responsible for the scientific instruments and laboratory. Throughout their careers, these men showed great passion not only for scientific research, but also for passing on scientific knowledge. They were educators and popularisers of science. Van der Ven was not only a gifted teacher, but also wrote a series of popular articles on physics and mathematics. Winkler wrote and published more than a dozen books aimed mainly at a youthful audience, explaining various aspects of the study of nature.

Winkler was a self-made man and social climber. He was born in Leeuwarden in 1822, where he attended school until he was 13, when he became an apprentice to a grain merchant.[52] While he was an apprentice he taught himself French, displaying a knack for languages that led him to subsequently learn German and English as well. Aged 22, Winkler married. His brother-in-law, a medical student in Groningen, suggested he continue his schooling and

[51] For more detail on these alternative designs see: Gestel and Reinink, "Het 'nieuwe museum' van Teyler (1877-1885)," 237–243.

[52] On Winkler's biography see: D. Winkler and H.W. Heinsius, "Tiberius Cornelis Winkler," in *Album der Natuur* (Haarlem: H.D. Tjeenk Willink, 1898), 320–329; Marian Stegeman, "T.C. Winkler En de Popularisering van de Natuurstudie: Een Onderzoek Naar de Verschillen En Overeenkomsten Met Het Werk van Heimans En Thijsse" (master thesis, Rijksuniversiteit Groningen, 2004); Marijke H. Besselink, "Winkler? Nooit van gehoord," *Teylers Magazijn* 57 (1997): 7–9; Joop van Veen, "Tiberius Cornelis Winkler, 100 jaar geleden overleden," *Teylers Magazijn* 57 (1997): 9–12.

become a surgeon. Following this advice, Winkler and his growing family subsequently moved to Haarlem. Two years later, having completed his training, Winkler opened a practice in the small village of Nieuwediep. Another four years later, however, he moved his family back to Haarlem, to ensure his children would obtain a good education.

As he later recalled, one of his first patients in Nieuwediep had been a fisherman who had been stung by a weever.[53] Intrigued by many more cases of pain caused by these fish, Winkler decided to learn more about weevers. This prompted him to first set foot in Teylers Museum, with the aim of consulting books on weevers in the library. This was in the year 1856.

The young surgeon's thirst for knowledge was apparently not lost on the curator of the geological collections, van Breda, and one thing led to another.[54] In 1858 van Breda asked Winkler whether he might be interested in studying and describing the fossil specimens from Oeningen – both those at Teylers Museum and those that formed part of van Breda's own personal collection. A prize essay competition concerning a treatise on fossils from this area had just been announced by the Holland Society. (Recall that van Breda was the Society's secretary.) Winkler replied "that [he] had never seen a petrified fish, far less studied one", but van Breda was evidently so impressed by the diligence with which Winkler had studied the weevers, that he did not consider this a problem.[55]

His doubts having been alleviated, Winkler set to work. Van Breda's trust in the young surgeon's skills proved to be well-founded, as the publication resulting from his efforts was awarded a gold medal by the Holland Society. With the Foundation's trustees' consent, van Breda subsequently enquired whether Winkler might want to continue studying further parts of the collection at Teylers. Winkler agreed, and eventually ended up publishing a comprehensive catalogue of the entire fossil collection. The first volume to this catalogue was published in 1863, another five had become available by 1868. After that, Winkler still compiled a further five supplements, detailing what had been added to the collection after 1868, as well as a catalogue of the museum's collection of minerals.

By the time the second volume to the catalogue of fossils was published, Winkler had been appointed curator of the geological collections at Teylers Museum. Along with van der Willigen, Winkler thereby became one of van Breda's successors after his retirement in 1864. That same year, Winkler had received an honorary doctorate from the University of Groningen during the festivities surrounding the university's 250th anniversary. The exact reasons for awarding Winkler this title were not recorded, but his work on the catalogue of Teylers Museum's fossil collection is sure to have played a part.[56] Winkler was immensely

[53] Winkler and Heinsius, "Tiberius Cornelis Winkler," 322.
[54] On the sequence of events leading to Winkler becoming involved with Teylers Museum see: Ibid., 322–323. And also: T.C.Winkler: "Geschiedenis van de palaeontologische collective, 1858 tot 189_, door den conservator", c. 1896, Haarlem, ATS, vol. 211, fol. 1-5.
[55] "dat ik nog nooit een versteenden visch had gezien en nog minder bestudeerd"; T.C.Winkler: "Geschiedenis van de palaeontologische collective, 1858 tot 189_, door den conservator", c. 1896, Haarlem, ATS, vol. 211, fol. 2.
[56] Stegeman, "T.C. Winkler En de Popularisering van de Natuurstudie: Een Onderzoek Naar de Verschillen En Overeenkomsten Met Het Werk van Heimans En Thijsse," 12–13.

proud of the honour thus bestowed upon him, and his daughter later recalled how he had referred to this event as "the apex of his glory".[57]

Another reason the University of Groningen might have decided to award Winkler a doctorate was that, by this time, he had built a reputation as an author and a translator of books. His research on weevers had already resulted in an article for the popular science journal *Album der Natuur*, and by 1864 Winkler had published more articles – both popular and scientific – and written a number of books of his own, aimed at a general audience.[58] They carried revealing titles such as "The animal world: stories for boys and girls" (*De dierenwereld: verhalen voor jongens en meisjes*) which was published in 1861, or "Short natural history of minerals: a textbook for schools" (*Korte natuurlijke historie der delfstoffen: een leer- en leesboek voor de scholen*), which appeared in 1863. Later books of Winkler's included "The Vertebrate Animals of the Past" (*De Gewervelde dieren van het verleden*), published in 1893, or the "Handbook for the Collector" (*Handboek voor den verzamelaer*), which carried the extensive subtitle "A useful book, teaching the assembly of, the ordering of and the care for all sorts of collections, adapted for young people".

This last work was published in successive instalments between 1880 and 1884 and, true to its title, covered a diverse range of possible amateur collections, including collectibles such as butterflies, minerals, seashells, eggs, stamps and coins. It is particularly revealing in that Winkler repeatedly stresses the importance of a diligent, disciplined approach to collecting. In Winkler's own words, he who wants his collection to last, it to be of any long-term use and wants to be able to impress his friends with it, "has to set about his task with passion and diligence, with care and perseverance."[59] Unsurprisingly, this is in no way at odds with his own work at Teylers Museum or, for that matter, his approach to scientific research in general. His main contribution to the overall body of science was the impressively detailed catalogue of Teylers Museum's collections, which proved to be indispensable in that it allowed for a far better assessment of individual specimens, both from the collection at Teylers Museum and other collections. This means that, essentially, Winkler's scientific work was descriptive – rather than interpretative – and therefore largely uncontroversial in nature.

Which is not to say that Winkler was not deeply involved in the major controversy shaping his field at the time: the discussion of Darwin's *Origin of Species*, first published in 1859. On the contrary: It was Winkler who first translated this book into Dutch. He did so following a request by Arie Cornelis Kruseman, a prominent publisher in Haarlem who was probably hoping the book's controversiality meant it would sell many copies, which had indeed proved to be the case in England.[60]

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[57] "het glanspunt van zijn roem"; Winkler and Heinsius, "Tiberius Cornelis Winkler," 324.

[58] For a bibliography of Winkler's publications see: Ibid., 326–329; Stegeman, "T.C. Winkler En de Popularisering van de Natuurstudie: Een Onderzoek Naar de Verschillen En Overeenkomsten Met Het Werk van Heimans En Thijsse," 106–111. The exact number of publications penned by Winkler however is difficult to ascertain because some of his books were published in instalments or were simply adapted versions of long articles he had published previously. His translations, too, often contain adaptations of the original work.

[59] "moet beginnen met zijn taak met lust en ijver, met zorg en volharding op te vatten." Tiberius C. Winkler, *Handboek Voor Den Verzamelaer*, vol. 1 (Leiden: A.W. Sijthoff, 1880), 28.

[60] Bart Leeuwenburgh, *Darwin in domineesland* (Rotterdam: Vantilt, 2009), 138.

In fact there is no reason to believe that Winkler himself took the initiative to translate the *Origins* or even knew of the book's existence before being approached by Kruseman. Given Winkler's growing reputation as an expert on geological matters and a translator – he had already translated other books on geology before Kruseman approached him with Darwin's book – and the fact that he was living in Haarlem, it is not even surprising that Kruseman turned to Winkler for a translation of the *Origins*.

At the same time however, the fact that Winkler accepted the task implies that even before having completed his translation of the book, he was sympathetic towards Darwin's ideas, which in turn implies a certain openness to new ideas and even progressivism on Winkler's behalf. He could quite simply have refused to translate Darwin's work, too. This was by no means out of the question: evidence from later years suggests Winkler acted self-confidently in his dealings with publishers. As much at least can be derived from snippets of his correspondence with the publisher Albertus Willem Sijthoff which have been preserved. In a letter Winkler penned in 1863 for instance, concerning a book he was writing for Sijthoff, his businesslike tone, although by no means impolite, is striking.[61] It is also in stark contrast with the respectful and almost reverent tone in which he wrote letters to the trustees of the Teyler Foundation. In 1885, Winkler sent Sijthoff a curt reply decisively rejecting the publisher's suggestion he translate "4 essays" which are not described in more detail. Having stated that, with regard to this request "I can answer nothing but: out of the question!", Winkler then briefly explains why, with extra exclamation marks for emphasis:

"The ideas of somebody who, for example, wants to cure rheumatism by bloodletting!! or who refuses to give morphine as an analgesic, and more of the same, – should be left untranslated in the land where they were born."[62]

As far as the translation of the *Origins* was concerned, Kruseman's hopes of cashing in on the controversy surrounding Darwin's theory of evolution the way his British counterparts had were not fulfilled. Kruseman decided to publish the book in instalments and had 1000 copies of the first one printed, reflecting his high hopes this would prove to be a good seller. Ultimately, however, he sold no more than 212.[63] The main problem seems to have been that, until the late 1860s, a controversial debate surrounding Darwin's ideas failed to take off in the Netherlands.[64] Kruseman even published a translation of one of Darwin's prominent English critics, the mathematician and geologist William Hopkins, in late 1860 in what presumably amounted to an attempt to ignite controversy.[65] But if that was indeed the case, his attempt proved to be futile.

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[61] T.C. Winkler to .W. Sijthoff, 05.11.1863, Leiden, UBL BC, Collectie Sijthoff, SYT-A.
[62] "4 opstellen"; "kan ik niets anders antwoorden als: volstrekt niet!"; "De ideëen van iemand die b.v. rheumatismus wil genezen door het doen van aderlatingen!! of die geen morphine wil geven tot pijnstilling, en dergelijken meer, - laat men onvertaald blijven in het land waarin zij geboren zijn." T.C. Winkler to A.W. Sijthoff, 28.02.1885, Leiden, UBL BC, Collectie Sijthoff, SYT-A.
[63] Lisa Kuitert, "'Geen grooten opgang': een voetnoot bij het Darwin-symposium 1992," *De Negentiende Eeuw* 17 (1993): 88.
[64] Leeuwenburgh, *Darwin in domineesland*, 138–148.
[65] Ibid., 140.

Interestingly, it was Winkler himself who helped invigorate a debate on the wider implications of Darwin's writings in the Netherlands. In 1867 he published an article in *De Gids* titled "The teachings of Darwin" (*De leer van Darwin*), in which he did not shy back from stating that Darwin's ideas implied man's ancestors had been ape-like.[66] Darwin himself only addressed this issue explicitly a few years later, when he published *The Descent of Man*. As a result, Winkler was increasingly identified as what one historian has described as "one of the most fervent proponents" of Darwin's theory in the Netherlands, despite the fact that he subsequently kept a low profile in these debates.[67] By the dawn of the 1870s, when religion became more of a sensitive issue in Dutch society (to which the controversy surrounding ulramontanist ideas mentioned above is further testimony) and the debates Kruseman had been counting on were finally stirred up, one prominent publication assailing Darwin's theory of evolution even carried the title "Our forefathers according to the theory of Darwin and the Darwinism of Winkler" (*Onze voorouders volgens de theorie van Darwin en het darwinisme van Winkler*).[68]

By this time, Kruseman had sold the rights to a Dutch translation of the *Origins*, after eventually breaking even and at least returning his investment.[69] An adaptation of Winkler's translation by H. Hartog Heys van Zouteveen was later published by the publishers Gebr. E&M Cohen, with more success.[70]

But even if Winkler's translation of the *Origins* turned out to be a commercial failure, it did enable him to keep abreast of the newest developments in geology and biology and is another indication of this man's lifelong thirst for learning and ambition to push the boundaries, not just of his own knowledge, but also of science as a whole.

2. Elisa van der Ven

From 1878 until 1909, Elisa van der Ven was in charge of Teylers Museum's scientific instrument collection. Just like his fellow curator Winkler, van der Ven displayed a great passion not just for acquiring scientific knowledge, but also for passing it on.

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[66] Tiberius C. Winkler, "De leer van Darwin," *De Gids* 31, no. 4 (1867): 22–70. On this article and an earlier essay of Winkler's in *De Gids* of 1864 in which he left no doubt that he was convinced by Darwin's arguments see: Ilse N. Bulhof, "The Netherlands," in *The Comparative Reception of Darwinism*, ed. Thomas F. Glick (Austin; London: University of Texas Press, 1974), 286–288.

[67] "een van de meest fervente voorstanders"; Leeuwenburgh, *Darwin in domineesland*, 147.

[68] B. H. Klönne, *Onze voorouders volgens de theorie van Darwin en het Darwinisme van Winkler* ('s Hertogenbosch: Henri Bogaerts, 1869). On the increasing controversy surrounding Darwin see: Leeuwenburgh, *Darwin in domineesland*, 223–228; Janneke van der Heide, *Darwin en de strijd om de beschaving in Nederland 1859-1909* (Amsterdam: Wereldbibliotheek, 2009).

[69] Kuitert, "'Geen grooten opgang': een voetnoot bij het Darwin-symposium 1992," 88.

[70] Ibid., 91.

Unlike Winkler, van der Ven had a purely academic background. He was born on October 5th 1833 in Edam.[71] His father had died just weeks before his birth, but his mother remarried and his stepfather, an apothecary, appears to have taken good care of Elisa and his older sister. His stepfather, along with the local doctor, are credited with having sparked the boy's interest in the natural sciences. In 1853, he enrolled at Leiden University at the Faculty of Mathematics and Sciences. Even before being awarded the highest distinction for his doctoral thesis ("summa cum laude") in May 1858, he had already drawn attention by winning the gold medal for his entry in a prize essay competition on an astronomical topic. He had also taken on a job as assistant or "second" teacher of mathematics, science and cosmography (*wiskunde, natuurkunde en cosmographie*) at the local secondary school (*Gymnasium*) in 1856. He was later promoted to "first" teacher and remained on in Leiden until 1864, when he was appointed headmaster of the newly founded polytechnic (*Hogere Burgerschool* or HBS) in Haarlem. He also taught classes there. In 1870 he took on an additional post as headmaster of the associated evening school (*Burgeravondschool*).

Besides introducing numerous students to mathematics and the sciences through his classes, van der Ven also reached out to a wider audience of non-specialists through publications in popular magazines. Between 1874 and 1909 he published a grand total of 133 articles in the popular science journal *Album der Natuur*, which had been co-founded by van Breda's assistant Logeman some years before.[72] In 1881 he was made a member of the board of editors of the journal *Eigen Haard*. As a fellow editor, Jeronimo de Vries, explained after van der Ven had passed away in a postscript to his obituary in the same journal:

"He was chosen, so that as a physicist he could be the adviser and right hand of the editorial staff in the assessment and selection of those articles that touch on this field of study."

De Vries elaborated how van der Ven had contributed to the journal for many years in different ways, stressing his contribution in the form of a column on scientific matters:

"He was charged with the care for the so-called miscellany section (*Verscheidenheid*), regularly published on the last page of each issue. Initially, for many years, providing this section was his work. The articles comprised information about topics regarding physics, discoveries, inventions, curious particulars, matters of general interest, with which he pleasantly and usefully entertained both us and the readers of *Eigen Haard*."[73]

[71] For the following biographical data see two obituaries written by H.J. Calkoen: H.J. Calkoen, "Levensbericht van Dr. E. van der Ven, 1833-1909," in *Jaarboek van de Maatschappij der Nederlandsche Letterkunde* (Leiden: E.J. Brill, 1910), 60–78; H.J. Calkoen, "Dr. Eliza van der Ven," *Eigen Haard* no. 34 (1909): 532–535.
[72] Geertje Janssen, "Elisa van der Ven en het Teylers Museum" (master thesis, Leiden University, 2007), 48.
[73] "De keuze viel op hem, opdat hij als natuurkundige de raadsman en rechterhand der redactie zou zijn, bij de beoordeling en de plaatsing van die artikelen, die dit vak van studie raakten." "[M]et name was hem opgedragen de zorg voor de zogenaamde *Verscheidenheid*, geregeld voorkomende op de laatste bladzijde der aflevering. In den eersten tijd, vele jaren lang, was de levering daarvan zijn werk. Het waren mededeelingen van natuurkundigen aard, ontdekkingen, uitvindingen, curieuse bijzonderheden, zaken van actueel belang, met welke hij ons en de lezers van *Eigen Haard* aangenaam en nuttig bezig hield." Jeronimo de Vries, "Naschrift," *Eigen Haard* no. 34 (1909): 535.

By the time van der Ven was writing these columns, he had been appointed curator at Teylers, as successor to van der Willigen. Even in retrospect, his appointment seemed surprising to his contemporaries. As was stated in his obituary:

"Van der Ven was […] more of a mathematician than a physicist, and therefore this appointment was greeted with surprise in academic circles."[74]

And maybe there were other reasons for their surprise as well: although, without doubt, van der Ven possessed a fine mind, he had not made a name for himself as a fully fledged member of the Dutch scientific elite. He was certainly of a different calibre than his predecessor, never for instance being elected a member of the prestigious Royal Dutch Academy of Sciences (*KNAW*). He had also been passed over for a professorship in Leiden in 1866, despite having been led to believe he would be appointed.[75]

Nevertheless, the trustees chose van der Ven from a pool of 16 candidates, as is revealed by an overview the trustees drew up summarising all candidates' qualifications.[76] According to this list, most of the applicants were teachers at a HBS, and many were in fact less qualified than van der Ven. But there were also some formidable competitors. The most serious other contender for the post was probably Pieter Adriaan Bergsma, the director of the Royal Magnetical and Meteorological Observatory at Batavia (Jakarta).[77] But Herman Haga, who was appointed to the chair in physics at Groningen just a few years later and transformed his institute into one of the nerve centres of Dutch experimental physics, applied for the curatorship in Haarlem as well. At this point, however, Haga had just recently completed his doctoral thesis in Leiden, so his potential might not have been discernible for the trustees yet.

What might also have helped tip the scales in van der Ven's favour was his involvement in many charitable causes. Throughout his period in Haarlem he was an active member of the Haarlem section of the *Maatschappij tot Nut van 't Algemeen* and was an active member of his Protestant, Reformed parish.[78] Finally, the trustees might also have thought that an inspirational teacher would contrast well with van der Willigen's aloof manner vis-à-vis amateurs, providing something of a fresh breeze at the Foundation. After all, the trustees themselves had lost track of van der Willigen's research efforts.

Whatever the trustees' considerations, van der Ven's contract left no doubt that he was expected to perform research at Teylers. The third paragraph read:

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[74] "Van der Ven was […] meer wiskundige dan natuurkundige, en daarom werd deze benoeming in de kringen der geleerden dan ook met verwondering vernomen." Calkoen, "Dr. Eliza van der Ven," 533.
[75] Calkoen, "Levensbericht van Dr. E. van der Ven, 1833-1909," 69–70.
[76] "Lijst van Sollicitanten Phys. Kabinet", c. 05.1878, Haarlem, ATS, vol. 107.
[77] Marijn van Hoorn, "Elisa van Der Ven and the Physical Laboratory of the Teyler Foundation (Haarlem), 1878-1909," *Making Instruments Count: Essays on Historical Scientific Instruments Presented to Gerard L'Estrange Turner* (1993): 283.
[78] Calkoen, "Levensbericht van Dr. E. van der Ven, 1833-1909," 72–73.

"It is recommended that he make diligent and faithful use of the collections that have been placed under his supervision for the promotion of the science of Physics".[79]

He was even provided with new laboratory premises at the same time the new annex to the museum was built. Van der Ven made regular use of the facilities that were available, acquiring 160 new instruments for the collection during his tenure and performing a series of experiments, mainly concerning electricity.[80] He published the results in the *Archives du Musée Teyler*, which he also edited as from 1881. It has to be said, however, that none of the papers he wrote were particularly far-reaching or had much of an impact. As Gerard Turner concluded:

"His results were presented at great length, including rather simple mathematical calculations. They show his lack of sophistication as a researcher, but are understandable if one regards him primarily as a teacher."[81]

A task he appears to have fulfilled with greater passion and success were the public lectures he was required to give during the winter months. He certainly gave more than the minimum amount of presentations he was required to give according to his contract[82], and his lectures in the new auditorium were fondly remembered by the author of van der Ven's obituary.[83] It is perhaps telling that the trustees let van der Ven inaugurate the auditorium once it had been completed, too, rather than anyone else associated with the Foundation. By 1899, however, van der Ven found himself too frail to undergo the strain of public lecturing, and according to the records he did not give any presentations at Teylers Museum before his death in 1909 anymore.

Besides his research and public lecturing, van der Ven undertook one other major task for the Foundation: he compiled a catalogue of the collections under his purview. This catalogue, in turn, reflects the way he saw the instruments in the museum and, more importantly, how he sought to render them accessible and understandable to a wider audience after the new annex had been opened. It is these changes in the way the scientific collections were perceived that we can now turn to.

[79] "Hem wordt aanbevolen, van de verzamelingen, die onder zijn beheer zijn geplaatst, een ijverig en getrouw gebruik te maken ter bevordering van de Natuurkundige wetenschap". "Instructie voor den te benoemen Conservator van het Physisch Kabinet van Teylers Stichting", 05.07.1878, Haarlem, ATS, vol. 106.
[80] Hoorn, "Elisa van Der Ven and the Physical Laboratory of the Teyler Foundation (Haarlem), 1878-1909," 284.
[81] Gerard L'E. Turner, *The Practice of Science in the Nineteenth Century: Teaching and Research Apparatus in the Teyler Museum* (Haarlem: Teylers Museum, 1996), 18–19.
[82] Hoorn, "Elisa van Der Ven and the Physical Laboratory of the Teyler Foundation (Haarlem), 1878-1909," 284.
[83] Calkoen, "Dr. Eliza van der Ven," 534.

IV. Function Follows Form

1. Moving House

It is not clear in how far Winkler and van der Ven were involved in the design process of the new annex to Teylers Museum that was completed in 1885. It is unlikely that they – together with the art curator Scholten – would not have been heard at all; but if so, then no records detailing this were kept. It is not even clear in how far the curators had any say in choosing and acquiring the display cabinets that were to hold the collections which fell under their purview.

But what does clearly transpire from the records is that it was entirely up to the curators to fill these cabinets. In other words, they were pivotal in creating the new museum's final appearance. What's more, the records reveal that they were very conscious of how visitors reacted to what they saw.

As was already mentioned, the new museum building had essentially been completed in January 1885 and the general public was given its first opportunity to inspect the new premises. Winkler and van der Ven subsequently lost no time in transferring their collections to the new wing. As the handwritten account of the construction of the new annex that was already quoted above reads:

"Very soon [afterwards] a beginning was made with storing the scientific instruments, and of the palaeontological objects by the respective curators in the rooms destined for this purpose, and this proceeded so steadily that they could already in the course of the summer amply satisfy the visitors."[84]

In the annual report Winkler submitted in April 1885 he did indeed proudly proclaim that he had already started preparing for the move during the summer of 1884, which facilitated a speedy transferral of all objects, and meant that by April 1885 "already 19 of the 20 cabinets are more or less ready".[85] "More or less" proved to be the operative term, however, as it still took Winkler until December 29th 1885 before he had moved every single of the 16.000 objects that formed part of the collection to the new premises.[86] Ironically, he even pointed out that a larger part of the collection was now concealed from the general public than before:

"the outcome has shown that there is less space in the new museum to display fossils than there was in the old museum. In the latter all objects were visible in cabinets and glass cases,

[84] "Zeer spoedig werd [daarna] een aanvang gemaakt met het verbergen van de physische instrumenten, van de paleontologische voorwerpen door de respectieve conservators naar de daarvoor bestemde lokalen, en dit ging zoo geregeld voort, dat deze reeds in den loop van de zomer de bezoekers ruimschoots konden voldoen." "Teyler's Fundatie te Haarlem", 1867-c.1887, ATS, vol. 78, fol. 107.
[85] "zijn er reeds 19 van de 20 kasten ongeveer gereed". "Jaarverslag 1884/1885", 08.04.1885, Haarlem, ATS, vol. 210, fol. 1.
[86] "Jaarverslag 1885/1886", 08.04.1886, Haarlem, ATS, vol. 210, fol. 1.

except for 144 drawers filled with petrifications, while in the new building there are 180 drawers, filled with objects for which there was no place in the glass cases and cupboards."[87]

At the same time, because of the move, more items than ever before from the art collection and even the Foundation's numismatic collection could be put on display. More specifically, the two rooms in which the geological collections had previously been stored had now become available.

The smaller of these two rooms was reserved for a display of the Foundation's coins and medals, which, incidentally, had only recently started to receive some serious attention. After A.J. Enschedé had been elected a member of Teylers Second Society he had not only donated his own collection of Roman coins to the Foundation, but renewed the trustees' interest in the coins and medals housed at the museum.[88] Pieter Teyler's stipulation that the numismatic collection should only ever be consulted in the presence of at least two trustees was evidently no longer taken too seriously and the collection therefore became accessible to the general public as from 1888, when the smaller of the former fossil rooms had been furbished with specially built showcases. Two years earlier, the trustees had even taken on an extra curator to look after their coins and medals, Th. M. Roest. Roest stayed on until 1898, cooperating closely with Enschedé in compiling a catalogue of the entire collection.[89]

Even more importantly, the larger of the two rooms – the room under the library that had been built as part of the first extension to the museum in 1824 and which had originally served to display the Foundation's first paintings – was now designated an exhibition area for prints and drawings from the art collection. Although this was not revolutionary or unheard of, it was a remarkable decision: the first exhibition devoted solely to prints and drawings – i.e. not to paintings – in the Netherlands had only been held in 1860, at the gallery of *Arti et Amicitiae*.[90] So the idea of creating a permanent or even temporary display of this type of art was comparatively new.

Starting in early 1886, i.e. immediately after Winkler had removed the last items from it, the room underneath the library underwent a costly renovation and refurbishment.[91] The casement windows were replaced by sliding ones, the floor was redone and a heating system installed, the cupboards that were already present were repainted, a fancy, Louis XVI-style table was set up at which prints and drawings could be studied, the ceiling was elaborately painted, 52 frames made from oak wood were ordered and an exquisite rotational display stand was set up to show prints or drawings in the middle of the room. A photograph made in the early 1890s and Scholten's own notes suggest that older works of art were placed in the display stand, whereas newer prints and drawings were framed and hung on the walls.[92] Some

[87] "de uitkomst heeft geleerd dat er in het nieuwe museum minder ruimte is om fossielen ten toon te stellen dan er in het oude museum was. Immers in het laatstgenoemde waren alle voorwerpen zichtbaar in de kasten en vitrines, behalven 144 laden die met versteeningen waren gevuld, terwijl er in het nieuwe gebouw 180 laden zijn, gevuld met voorwerpen die geen plaats konden vinden in de vitrines en kasten." Ibid.
[88] H. Enno van Gelder, "Het Penningkabinet," in *"Teyler" 1778-1978* (Haarlem; Antwerpen: Schuyt, 1978), 24.
[89] Ibid.
[90] Renske E. Jellema, "De inrichting van de aquarellenzaal in 1886," *Teylers Magazijn* 29 (1990): 7.
[91] On this see: Jellema, "De inrichting van de aquarellenzaal in 1886."
[92] Ibid., 8–10.

of these were apparently exchanged regularly. The grand total of this refurbishment came to more than f3000,-. For comparison: this was the same as van der Ven's annual salary. The trustees must have been very satisfied with the end result, too, as Scholten received an extra payment of f1000,- in addition to his regular salary in April 1886.

So Scholten and the trustees had gone to great lengths to ensure visitors could study works of art from the Foundation's collection in aesthetically pleasing surroundings. But Winkler, too, was clearly very conscious of the overall visual impact the display of the geological collections would have on visitors. In his reports on the transferral, he spoke of "showpieces" (*prachtstukken*), and had special glass cases made for some of the largest and most spectacular minerals.[93]

This in itself already suggests that, when arranging the objects in the museum, Winkler saw himself as not just catering to fellow specialists, but also to the general public. Which, it must be emphasised, is not to say Winkler in any way neglected his fellow experts in palaeontology and mineralogy – on the contrary, it was they who formed his primary "target audience", because, despite his talk of "showpieces" and construction of special cases and even mountings for fossils, Winkler was not trying to create some sort of purely aesthetic arrangement, or an educational illustration of geological theories of some sort aimed at laypeople. Winkler obviously wanted to create a display that was also pleasing to the eye, but first and foremost, there were two main criteria which determined where he placed an object in the new museum. Firstly, an object's size: large items were framed and hung on the wall or placed in the larger display cabinets, whereas smaller items were stored in drawers. Secondly, an object's geological properties: specimens that had been unearthed in the same geographical area were grouped together and within these groups all specimens of a particular type were assembled side by side.

But at the same time Winkler cared deeply about the accessibility of the collections, in the sense that he wanted them to be understandable to a lay audience. This became crystal clear in 1888, when he started to realise that the lay audience visiting the museum was bewildered by – or rather was not even consulting – the copy of the comprehensive, scientific catalogue of the entire collection which Winkler had compiled and put out on one of the showcases. As Winkler himself recalled in his recollections at the end of the 1890s:

"After the complete catalogue had been available to visitors of the museum for a considerable time, lying on the glass case in the first room, it became increasingly apparent that only the educated took a look at it, whilst the general public did not pay the least bit of attention to it. It was clear that, if the collections were to be appreciated by the uneducated as well, it was necessary to provide them with a popular guidebook."[94]

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[93] "Jaarverslag 1884/1885", 08.04.1885, Haarlem, ATS, vol. 210, fol. 2.

[94] "Nadat de volledige catalogus reeds een geruimen tijd ter beschikking van de bezoekers van het museum, op de vitrine in de voorzaal had gelegen, bleek het hoe langer hoe meer, dat slechts geleerden er een blik in wierpen, maar dat het groote publiek er geen de minste aandacht aan schonk. Het was duidelijk dat, als de collecties ook door niet geleerden zou worden gewaardeerd, het noodig was hen daartoe een populairen wegwijzer te verschaffen." T.C.Winkler: "Geschiedenis van de palaeontologische collective, 1858 tot 189_, door den conservator", c. 1896, Haarlem, ATS, vol. 211, fol. 20.

Providing visitors with a popular guidebook is exactly what Winkler subsequently did, essentially distilling his comprehensive catalogue into a small booklet providing an overview of the collection and more information on selected items of particular interest. He wrote two such booklets, one covering the palaeontological collection, the other the mineralogical collection, and had both of them published in both Dutch and French. In his recollections he proudly stated that the first edition of the Dutch guidebook on the mineralogical collection was soon sold out and needed to be reprinted.[95]

2. Function Follows Form

The fact that Winkler went to the effort of publishing a guidebook for the benefit of lay visitors, particularly the fact that he realised lay visitors would benefit from such a publication in the first place, reflects how passionate he was about the diffusion of scientific knowledge. It chimes well with his track record as an author of numerous popular science books.

But it is highly significant for another reason as well. What helped Winkler realise that popular guidebooks were necessary and what at the same time presumably also helped him to persuade the trustees to finance the publication of such guidebooks – he had actually suggested a similar scheme more than two decades earlier and even written a draft version of a guidebook already, but "as a result of the coincidence of various circumstances" this was never published[96] – was the fact that the amount of lay visitors to Teylers Museum had increased so significantly by the late 1880s. The crucial point is that this increase in visitors, in turn, had everything to do with the new annex to the museum.

This point is so crucial because what was essentially happening, was that the geological collections – as well as the scientific instrument collection, to which we will turn below – were being subjected to the expectations of a lay public as to what they would be presented with in a "museum", as that term had come to be defined over the course of the previous decades.

Put differently, the average visitor to Teylers Museum after 1885, enticed by the monumental, neo-classical entrance that was almost stereotypical of a public museum, would not have expected to find himself (or herself) confronted with a collection of scientific specimens and instruments that had been arranged – primarily – according to scientific principles. The curators in charge of the collections had not put out the specimens and instruments on display with the intention of presenting them as cultural artefacts, i.e. as props in aid of an "exercise in civics". Instead, what the visitor encountered was more akin to a scientific repository, containing specimens and instruments of which many were still regularly used for scientific research purposes. What the visitor was more likely to expect – the collection of fine art in the

[95] Ibid.
[96] "ten gevolge van een samenloop van omstandigheden"; Ibid., fol. 7.

First Art Gallery and the gallery under the library – was presented in a section of the museum that was only accessible by traversing the area in which the scientific collections were on display.

It was this discrepancy between, on the one hand, the visitors' expectations that had been generated by the outward appearance of Teylers Museum upon completion of the 1885 annex, and, on the other hand, the science curators' concept of what purpose their collections were to serve, that one can safely assume to have played a major part in causing the bewilderment Winkler recognised amongst lay visitors, prompting him to write popular guidebooks.

At the same time, the fact that the trustees agreed to finance these guidebooks – which they appear not to have done about two decades earlier – underscores how, by the 1880s, they had more of a public role in mind for Teylers Museum than ever before.

To rephrase this, the publication of Winkler's guidebooks can be seen as the result of a confluence of two major historical strands that shaped the history of Teylers Museum throughout the 19th century: on the one hand, Teylers Museum had been conceived as an 18th century repository to Teylers Learned Societies; on the other hand, it was subjected to the changing connotations of the word "museum", particularly in regard to the public role "museums" were to fulfil. By the 1880s, these two strands had become so incompatible that the section of Teylers Museum that contained the scientific collections had become something of a chimaera. And then, crucially, by thinking in the terms of the popularisation of science which were so familiar to him, it was Winkler who, through his guidebooks, attempted – and, judging by the apparent popularity of at least one of the booklets, also succeeded – in uniting these two strands, at least as far as was possible.

At this point it is worth recalling that van der Ven had started building a reputation as a populariser of science by the time the new annex was completed as well. He, too, soon published a popular guidebook to the collections that fell under his purview. What is particularly striking in van der Ven's case, though, is that he began emphasising the historical value of many of the scientific instruments on display. It is to this we can now turn.

3. The Birth of a Museum of the History of Science

Winkler recorded his actions at Teylers Museum in more detail than van der Ven. But a closer look at van der Ven's approach to the collection that fell under his purview reveals that he too must have noticed a certain bewilderment amongst lay visitors, i.e. how the instruments on display were incomprehensible to them. And again, the new annex played a part in highlighting the lay public's problems.

As much at least can be induced from the way he adapted the catalogue he had compiled of all instruments in the collection. Recall how this had been laid out as one of his main tasks upon

taking up the post of curator. In fact, he was to perform this task as quickly as possible. As the second paragraph of his contract, as drawn up in 1878, read:

"The Curator shall, after taking up his duties, as soon as possible make a new inventory of the objects that are present in the Physics Cabinet, – and furthermore occupy himself with preparing from this inventory a Systematically-ordered Catalogue, to which he shall regularly add the new objects with which the Cabinet will be enriched in the future."[97]

Van der Ven had completed this task in 1882.[98] Essentially, the catalogue he produced was identical with an inventory. It was basically just a list of all instruments in the Foundation's possession, ordered by the area of physics they belonged to and with a succinct description.

By 1898, this catalogue was in need of an update. Remarkably, however, van der Ven not only updated the list of instruments, but added a 22-page "guide" to the collections. Van der Ven left no doubt that in doing so he hoped to render the collections understandable and useful not just for the experts who came to the museum in search of specific apparatus (and who would know how to use the catalogue that formed the second part of the booklet), but also to the general public. As he wrote in the introductory remarks to the "guide":

"This "Guide" should be viewed mainly as an attempt to make a visit to Teylers' unique collection of scientific instruments more fruitful for laypeople in the area of physics and therefore more attractive."[99]

He subsequently implied that he had found himself in a bit of a dilemma, because he could of course not assume that a lay audience would be familiar with the laws of physics, which made it impossible to describe the instruments on display in any appropriate way within the limited space of the guidebook. As he put it: "With one of our sacred writers we might say that even the whole world could not contain the books that could comprise such a description."[100] The result was inevitable: "Much of what is available must be passed over in silence."[101]

But van der Ven did have a – at least partial – solution to this problem. As he stated a little circuitously:

"But despite this there is so much in the collection that, even if it is only because of its historical value, can elicit the interest of those too who are unfamiliar with the physical

[97] "De Conservator zal na de aanvaarding zijner betrekking zoo spoedig mogelijk een volledigen inventaris opmaken van de voorwerpen, die in het Physisch Kabinet aanwezig zijn, - en voorts zich bezighouden met daarvan te vervaardigen een Systematisch-geordenden Catalogus, dien hij daarna geregeld zal aanvullen met de nieuwe voorwerpen, waarmede het Kabinet in het vervolg verrijkt zal worden." "Instructie voor den te benoemen Conservator van het Physisch Kabinet van Teylers Stichting", 05.07.1878, Haarlem, ATS, vol. 106.

[98] *Catalogus van de Physische Instrumenten, Teylers Museum* (Haarlem: De Erven Loosjes, 1882). Van der Ven had presented the manuscript of his catalogue to the trustees in September 1882: "Directienotulen", 01.09.1882, Haarlem, ATS, vol. 10.

[99] "Men zie in dezen "Gids" hoofdzakelijk een poging, om een bezoek aan Teylers' eenige verzameling van natuurkundige instrumenten voor leeken op natuurkundig gebied meer vruchtbaar te maken en daardoor meer aantrekkelijk." Elisa van der Ven, *Gids door de Verzameling Physische Instrumenten in Teyler's Museum* (Haarlem: De Erven Loosjes, 1898), iii.

[100] "[W]ij [zouden] met een onzer gewijde schrijvers kunnen zeggen, dat de gansche wereld de boeken niet zou kunnen omvatten, waarin zoodanige beschrijving zou moeten worden opgenomen." Ibid.

[101] "Veel van wat voorhanden is moet dan ook met stilzwijgen worden voorbijgegaan." Ibid.

sciences, so that even just pointing them out in a better fashion did not seem like futile work to me."[102]

This clearly implies that van der Ven had discovered that history provided an angle from which he could approach the collection without losing the lay public's interest, because history formed a common denominator for all visitors, i.e. something every visitor could relate to, and which was more easily explicable than the science behind the machines.

Throughout the guidebook Van der Ven accordingly repeatedly elaborated on various items' historical significance, both for research performed in Haarlem and with regards to science as a whole. And the visitor's sense of history would have been augmented by van der Ven's decision to store most instruments from before 1850 in the Oval Room, and all later devices in the new building. With the explanations from the guidebook, history became a little more tangible in the Oval Room.

To clad this in the phrases used above, the confluence of the two strands of history that determined the development of Teylers Museum throughout the 19th century not only resulted in popular guidebooks – both Winkler's and, a decade later, van der Ven's – but also in the historical and therefore cultural value of the scientific instruments being emphasised within the museum premises.

At this point it also becomes significant that a separate laboratory had been constructed for van der Ven at the same time the new annex to the museum was being built. Very little is known about the construction as well as the usage of this laboratory. The few snippets of information available include an entry from the minutes of a meeting of the trustees held in January 1884, which reads:

"It is decided, in accordance the proposal by the Curator of the Physics cabinet, Mr E. van der Ven, to build a new chemical and physical Laboratory, very close to the existing Museum and Cabinet Building. – The costs of the plan are estimated at over f 6000,-."[103]

Some weeks later, the company Mertens and Son is tasked with building this laboratory for f6120,-.[104] That such a large amount of money was made available for research facilities is all the more surprising if one considers van der Ven's subsequent relative lack of output.

The crucial point, however, is that this laboratory was off limits to the general public. This in turn underscores just how important it was that – through historical contingencies – large parts of the instrument collection were stored in the museum building, i.e. the Oval Room and what came to be referred to as the Instrument Hall in the new annex. After all, if all the instruments had been stored in the laboratory, which was only accessible to experts, van der

[102] "Maar niettegenstaande dat is er in de verzameling zoveel dat, al was het alleen om zijne historische waarde, de belangstelling, ook van in natuurkundige wetenschappen onbedrevenen, tot zich kan trekken, dat eene nadere aanwijzing daarvan alleen mij geen nutteloos werk toescheen." Ibid.
[103] "Wordt besloten, overeenkomstig het voorstel van den Conservator van het Physisch Kabinet, Dhr E. van der Ven, een nieuw chemisch & physisch Laboratorium te doen bouwen, in de onmiddelijke nabijheid van het bestaande Museum- en Kabinets-gebouw. – De kosten daarvan zijn op ruim f6000,- begroot." "Directienotulen", 24.01.1884, Haarlem, ATS, vol. 11.
[104] "Directienotulen", 29.02.1884, Haarlem, ATS, vol. 11.

Ven would not have had to write a popular guidebook in which he reverted to history to make the instruments more accessible to laypeople.

The importance of van der Ven's guidebook can hardly be overestimated: it provides an important marker in the history of the Teyler Foundation's instrument collection, because it can be taken as the point at which part of the Teyler Museum became a museum of the history of science.

4. Science Museums and Museums of the History of Science

Van der Ven emphasising the history of the instrument collection in his care will have served to enhance its reputation as an instrument collection of great historical value which it had already started acquiring over the previous decades. Recall how two visitors (von Sierstorpff and Niemeyer) had already remarked upon the collection's future potential as an illustration of the history of physics as early as 1806, how van Breda had stipulated that instruments of historical value should not be disposed of in 1839, and how the Teyler Foundation had been sought out and asked to contribute some of the historical instruments from its collection to displays at international exhibitions in the late 1870s and early 1880s.

Perhaps the best illustration of both the fact that, above all, the historical value of the Teyler Foundation's scientific instrument collection was widely recognised by the turn of the century, but also of the fact that Teylers Museum as a whole was increasingly being perceived as a museum devoted in part to the history of science (and was not just presented as such by van der Ven), is a keynote speech held in 1905 by the Dutch Nobel Prize laureate Jacobus van 't Hoff at the second annual meeting of the trustees of the still-to-be-founded *Deutsches Museum* in Munich. The title of his speech was "The Teyler Museum in Haarlem", and its subtitle "the significance of historical collections for science and technology", clearly demonstrating that the museum was perceived as partially a history museum by outsiders.[105]

In a further illustration of just how much the term "museum" had come to dominate how the instrument collection in Haarlem was perceived, van 't Hoff started his speech by stating that "the expression Teyler-Museum does not correspond to the original nature of Teylers' establishment"[106], explaining how it was related to the Teyler Foundation, and who Pieter Teyler van der Hulst had been.

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[105] Jacobus H. van 't Hoff, *Das Teyler-Museum in Haarlem und die Bedeutung historischer Sammlungen für Naturwissenschaft und Technik*, vol. 9, Deutsches Museum: Vorträge und Berichte (München: Deutsches Museum, 1912). Van 't Hoff had previously published his speech in Dutch: Jacobus H. van 't Hoff, "Teyler's Museum en de beteekenis van geschiedkundige verzamelingen voor natuurwetenschap en industrie," *De Gids* 70 (1906): 338–348.

[106] „[...] der Ausdruck Teyler-Museum dem eigentlichen Charakter von Teylers Gründung nicht entspricht". Hoff, *Das Teyler-Museum in Haarlem und die Bedeutung historischer Sammlungen für Naturwissenschaft und Technik*, 9:1.

The context within which this speech was held carries a lot of significance as well. Not only did the audience consist of many high-profile listeners – including the Prince Regent and future King Ludwig III of Bavaria – but the establishment of the *Deutsches Museum* in itself constitutes a milestone in the history of museums. Its importance lies in the fact that this was the first large-scale attempt at enhancing scientists' and engineers' social status by devoting a museum to the fruits of their labour and the science underlying them. The idea was that a museum – generally recognised as a place of high culture and learning – would help fashion science and engineering as "cultured", high-brow activities.

Put differently, the designers of the museum in Munich were actively availing themselves of the social mechanisms that the scientific collections at Teylers had been subjected to more or less by chance and which had prompted Winkler and van der Ven to write their guidebooks. Visitors came to a museum with certain expectations. More specifically, they arrived expecting to find artefacts of "high culture" displayed in an understandable manner. What the designers of the *Deutsches Museum* had recognised was that, firstly, they needed to provide these visitors with a stereotypical museum which would elicit all the behavioural patterns associated with a museum visit – to use Tony Bennett's term once again, a place where visitors would automatically launch into an "exercise in civics". And that then, once such a forum had been created, the items selected for display there would, secondly, automatically be perceived as "high culture".

In a sense this was similar to what had happened at the Special Loan Exhibition at South Kensington in 1876 (as was described in the previous chapter). A significant difference however, was that what was being built in Munich was a permanent museum, not "just" a temporary international exhibition.

Some caution is called for in that it would not do the prolific and complex driving force behind the establishment of this new museum, Oskar von Miller, justice to reduce his brainchild to a mere image campaign in aid of science and engineering. Von Miller had built a reputation as a first class engineer – he had been largely responsible for installing Bavaria's first power grid, for instance – long before he first came forward with ambitious plans to build a museum in 1903, he was genuinely interested in demonstrating the excitement of technology to the youth, and his plans for a museum always included plans for an extensive library that could serve as a reference library and provide inspiration for engineers.[107] But at the same time it is no coincidence that the museum's full title was *Deutsches Museum von Meisterwerken der Naturwissenschaft und Technik*, i.e. "German Museum of Masterpieces of Science and Technology". The term "masterpieces" itself already suggests that what was on display was deemed to be of superior quality.

[107] On von Miller see: Wilhelm Füßl, *Oskar von Miller 1855-1934: Eine Biographie* (München: C.H. Beck, 2005). Interestingly, von Miller visited the Paris Electrical Exhibition in 1881 – recall that the Cuthbertson Electrostatic Generator from Teylers Museum was on display there – and this visit proved to be "turning point" in his life: Ibid., 46–47.

Neither is it a coincidence that from the very beginning onward portraits of famous scientists and engineers were acquired for the museum's collections.[108] In later years busts and medals depicting famous individuals were acquired as well. When a preliminary exhibition of the museum's collections opened to the public in 1906 – due to multiple delays its purpose-built housing on an island in the centre of Munich could only be completed in 1925 – this already included a section reserved for the display of the portraits acquired thus far. The purpose-built museum building then even included what was referred to as a "hall of honour" for the display of the effigies from the museum's collections.[109]

As one historian has recently summarised, "Das wirklich Neue und Innovative am Deutschen Museum war letztlich die Übertragung des klassisch-humanistischen Kulturbegriffs auf das Gebiet der Naturwissenschaften und Technik".[110]

Significantly, what was happening in Munich was soon discernible throughout the world. Within the space of a few decades, museums of science and technology with similar aims had proliferated all over the globe. To name but a few, the Science Museum was separated from the South Kensington Museum in London in 1909, the Vienna Technical Museum opened to the public in 1918 after ten years of preparation, and the National Technical Museum in Prague opened in 1908.

To whatever degree they were directly influenced by the establishment of the *Deutsches Museum*, the designers of these new museums would have been well aware of developments in Munich.[111] Later examples of the *Deutsches Museum*'s direct influence include that of the American Julius Rosenberg, who was so impressed with what he saw in Munich in 1911 that he eventually provided $7 million for the establishment of the Museum of Science and Industry in Chicago, which opened in 1933. In another example, during the early 1930s a Russian delegation that was planning to establish a "Palace of Technology" in Moscow had come to Munich looking for inspiration.

Clearly, it was not only those who were involved with the *Deutsches Museum* who felt that scientists and engineers deserved more recognition for their contribution to society as a whole – they were tapping into some widely held sentiments.

In a further indication of the growing sense of pride and community amongst scientists and engineers as well as an increasing desire to foster this, interest in the history of science and technology increased significantly during the early decades of the 20th century. The scholarly journal ISIS for instance, devoted to the history of science, medicine and technology, was first published in 1912, and the History of Science Society was set up in 1924. In the Netherlands,

[108] On the acquisition of portraits see: Eva A. Mayring, "Das Porträt als Programm," in *Circa 1903: Artefakte in der Gründungszeit des Deutschen Museums*, ed. Ulf Hashagen, Oskar Blumtritt, and Helmuth Trischler (München: Deutsches Museum, 2003), 55–56.
[109] Ibid., 57–62.
[110] Olaf Hartung, *Museen des Industrialismus: Formen bürgerlicher Geschichtskultur am Beispiel des Bayerischen Verkehrsmuseums und des Deutschen Bergbaumuseums* (Köln: Böhlau, 2007), 53.
[111] On the museum's role model status throughout its history see: Bernhard S. Finn, "Der Einfluss des Deutschen Museums auf die internationale Landschaft der Wissenschafts- und Technikmuseen," in *Geschichte des Deutschen Museums: Akteure, Artefakte, Ausstellungen*, ed. Wilhelm Füßl and Helmuth Trischler (München: Prestel, 2003), 397–405.

a *Nederlandsche Vereeniging voor Geschiedenis der Geneeskundige Weetenschappen* (NVGGW) had been founded as early as 1898, and around this time a Historical Commission was also established by members of the *Natuur- en Geneeskundig Congres* (NGC).[112] The NGC was essentially a society for the promotion of the sciences that held regular national conferences (it was roughly comparable with the British Association for the Advancement of Science and its annual conferences). Most importantly, however, the Dutch association for the history of science, medicine and technology (*Gewina*) was established in 1913, absorbing all members of the NVGGW. The preceding decades had already seen ever more frequent inferences of past achievements of Dutch researchers, with the clear aim of bolstering a sense of national pride amongst the budding, late 19th century Dutch scientific community.[113]

This increase in attention the history of science, medicine and technology was receiving entailed a growing interest in the material witnesses of past science, i.e. the scientific instruments past researchers had used. In 1907 for instance the Historical Commission organised a temporary "Historical Exhibition of Science and Medicine" (*Geschiedkundige Tentoonstelling van Natuur- en Geneeskunde*) in Leiden to coincide with the eleventh national congress of science and medicine. As the title page of its catalogue reveals, the exhibition carried the motto "past is prologue".[114] Medical preparations and scientific instruments on loan from learned societies and university laboratories from all over the country were exhibited in two university buildings: the library and the university's main building. Roughly a dozen items from Teylers Museum were on display as well, including gasometers used by van Marum and a collection of telephones used for demonstratory purposes.[115]

But while this was a temporary exhibition, a little over two decades later a series of – permanent – museums of the history of science had been founded. In Oxford the Lewis Evans Collection, assembled by the private collector Evans in the early 20th century and subsequently donated to Oxford University, was made publicly accessible in 1924 and later became the Museum of the History of Science.[116] At about the same time, Andrea Corsini founded the "Group for the Preservation of the National Scientific Heritage" in Italy, and by 1930 the Istituto di Storia della Scienza in Florence had established a permanent exhibition of historical scientific instruments, the precursor to today's Museo Galileo.[117] In Leiden, the Netherlands Historical Science Museum (*Nederlandsch Historisch Natuurwetenschappelijk Museum*), precursor to what is currently known as the Museum Boerhaave, was opened to the public in 1930, after some years of lobbying, primarily by Claude Auguste Crommelin, a former laboratory assistant to Kamerlingh Onnes and director of the Leiden Instrumentmakers School (*Leidse Instrumentenmakers School*). The museum's initial collection consisted

[112] On these developments in the Netherlands see: Willem Otterspeer, "Begin en context van het Museum Boerhaave," in *75 jaar Museum Boerhaave* (Leiden: Museum Boerhaave, 2006), 7.
[113] On this see for example: Klaas van Berkel, *Citaten uit het boek der natuur: opstellen over Nederlandse wetenschapsgeschiedenis* (Amsterdam: Bert Bakker, 1998), 221–239.
[114] *Catalogus van de geschiedkundige tentoonstelling van natuur- en geneeskunde* (Leiden: Sijthoff, 1907).
[115] Ibid., 109 & 112.
[116] Jim Bennett, "European Science Museums and the Museum Boerhaave," in *75 Jaar Museum Boerhaave* (Leiden: Museum Boerhaave, 2006), 77.
[117] Paolo Galluzzi, "Introduction," in *Museo Galileo: a Guide to the Treasures of the Collection* (Firenze: Giunti, 2010), 5.

mainly of instruments that had been used at Leiden University.[118] Also in the early 1930s, Pieter Hendrick van Cittert, a physicist at the University of Utrecht, started drawing attention to the instrument collection of the dormant *Natuurkundig Gezelschap*, a learned society that had been founded in the 18th century. Together with his wife he spent the following years lobbying for the establishment of what is now the University Museum.[119] In North America, by the 1930s David P. Wheatland, graduate and employee of the physics department at Harvard, had also started raising awareness for his university's historical instruments and began accumulating some of them. A first exhibition of these instruments was organised in 1936, but the collection was only recognised and funded as "The Collection of Historical Scientific Instruments" after 1947.[120]

At the same time that these new museums of the history of science were being founded to preserve and display historical collections of scientific apparatus, 18th-century instrument collections that had not been dispersed during the 19th century were integrated into some of the science museums that were also being founded during this period. In 1903, for example, the very first items that were donated to the – as yet to be built – *Deutsches Museum* were the instruments that had formed the repository of the Bavarian Academy of Sciences.[121] Or in 1927, the bulk of the George III collection of scientific instruments dating back to the 17th century was transferred to the Science Museum from King's College.[122]

So while Teylers Museum had started being perceived as part museum of the history of science around the turn of the century already and had been invoked as such during the preparatory stages for the *Deutsches Museum*, by the 1930s it had become one museum of the history of science amongst many.

It is of course interesting to see how Teylers Museum developed during this period in history, particularly in how far the instrument collection in Haarlem was affected by international developments. This period coincides largely with the curatorship of Hendrik Antoon Lorentz, who accepted the post in 1909 (although only formally taking it up in 1912) and remained on until his death in 1928. The following section takes a closer look at his tenureship, and how he handled the instrument collection that fell under his purview.

[118] On this see: Otterspeer, "Begin en context van het Museum Boerhaave."
[119] Esger Brunner, "Erfenis van een echtpaar," *Nederlands Tijdschrift voor Natuurkunde* 78, no. 1 (2012): 26–27.
[120] David P. Wheatland and Barbara Carson, *The Apparatus of Science at Harvard, 1765-1800* (Cambridge: Harvard University, 1968), 7–8. I am grateful to Sara Schechner for providing additional information on Wheatland's early activities.
[121] Wilhelm Füßl, "Gründung und Aufbau 1903-1925," in *Geschichte des Deutschen Museums: Akteure, Artefakte, Ausstellungen*, ed. Wilhelm Füßl and Helmuth Trischler (München: Prestel, 2003), 70.
[122] Alan Q. Morton and Jane A. Wess, *Public & Private Science: The King George III Collection* (Oxford: Oxford University Press, 1993), 37.

V. Lorentz: A Theoretician as Curator

1. A Revered Theoretical Physicist

By the beginning of the 20th century Hendrik Antoon Lorentz was something of a living legend, certainly amongst physicists. Revered by all those he ever dealt with, he was held in high esteem both for his professional work and his good nature. The iconic Albert Einstein was but one of many brilliant minds who looked up to the Dutchman who gave his name to the linear transformations so important to the theory of special relativity.

Lorentz' life and career have been summarised and discussed in various publications, so a short summary of his activities before coming to Haarlem can suffice here.[123] He was born in Arnhem in 1853, attended the local HBS, and was subsequently able to study physics in Leiden. In 1875 he completed his dissertation, and less than three years later he had been appointed to the chair of theoretical physics at his alma mater, at the tender age of 24.

This appointment was not only remarkable because Lorentz was so young, but also because the chair of "mathematical physics and mechanics" he was appointed to had been newly created, a development which in itself is indicative of the changes occurring within physics, and which also symbolises the changing status the natural sciences were accorded within academia. More to the point, although the creation of Lorentz' chair itself did not yet uproot the mid-19th century organisational structures within which it was still embedded, it enabled him to become what would be labelled a "theoretical physicist" by the early 20th century. The emergence of a field of "theoretical physics" is in turn indicative of the gradual emergence of a concept of "pure" science, or the idea that it was perfectly legitimate to practice science in and of itself – to paraphrase the artist's battle cry, what emerged was a concept of "la science pour la science". Research became important in and of itself, a development that was reflected in the courses Lorentz' taught in Leiden. Recall how this would have been unthinkable for van Marum – or, for that matter, for any of his contemporaries – and how Frederik Kaiser and van der Willigen had still been pioneers in emphasising that science was about research, more than about character formation or generating an economic benefit.

In 1902, Lorentz received one of the first ever Nobel Prizes, together with Pieter Zeeman. It was around about this time that he actively began to foster international cooperation. It seems strange to emphasise this in the case of a Nobel Prize laureate, but until about the turn of the century Lorentz' life and work had been a surprisingly local affair. Within a few years,

[123] On Lorentz and his position within the history of science see for instance: Anne J. Kox, "Hendrik A. Lorentz, 1853-1928," in *Van Stevin tot Lorentz: portretten van achttien Nederlandse natuurwetenschappers*, ed. Anne J. Kox (Amsterdam: Bakker, 1990), 226–242; Bastiaan Willink, *De tweede Gouden Eeuw: Nederland en de Nobelprijzen voor natuurwetenschappen, 1870-1940* (Amsterdam: Bert Bakker, 1998), 105–109; Bert Theunissen, *"Nut en nog eens nut": wetenschapsbeelden van Nederlandse natuuronderzoekers, 1800-1900* (Hilversum: Verloren, 2000), 168–184; Frans van Lunteren, "Wissenschaft internationalisieren: Hendrik Antoon Lorentz, Paul Ehrenfest und ihre Arbeit für die internationale Wissenschafts-Community," in *Einstein und Europa: Dimensionen moderner Forschung*, ed. Gert Kaiser and Arne Claussen (Düsseldorf: Wissenschaftszentrum NRW, 2006), 25–35.

however, he enjoyed the same sort of reverence internationally he must have become acquainted with in the Netherlands already. That he only began to discover the world in his late 40s is even more surprising if one takes into account that his German, English and French were all impeccable – judging, at least, by the flawless letters he wrote in these languages.

And then, as he approached 60, Lorentz accepted the offer of becoming the curator of physics at Teylers Museum or, more specifically, the offer of becoming the head of the Teyler Foundation's physics laboratory. This period of his life and the processes leading up to his taking up this position are usually only addressed perfunctorily[124], so they are worth dwelling on in some detail, before returning to the question of how Lorentz saw Teylers Museum, or rather how he handled the historical instrument collection that fell under his purview for almost two decades.

2. Much to Offer

Elisa van der Ven passed away on June 27th 1909. Even before his funeral, the first unsolicited application was sent off to the trustees, asking for details about the vacancy that had obviously just opened.[125] Although this applicant – a teacher at a local polytechnic – received a fairly curt reply, two others who wrote just days later were told that nothing had been decided yet with regard to this position, but applications could be sent to the trustees.[126] By the time these applications would have arrived (none have been preserved) towards the end of July, the trustees had, however, already set their sights on Lorentz. The minutes of the meeting of the board of trustees on July 28th 1909 read: "Regarding the vacancy for conservator of the Physical Cabinet advice will be sought from prof. Lorentz in Leiden, at which opportunity the professor will be asked if he is inclined to accept this position himself."[127] A letter inviting Lorentz to Haarlem was sent off that very same day – although no mention was yet made of the vacant post being offered to him.[128] Lorentz promptly replied he would be happy to come, and a meeting was scheduled for early August.[129] It was to take

[124] One notable exception is: Marijn van Hoorn, "The Physics Laboratory of the Teyler Foundation (Haarlem) Under Professor H.A. Lorentz, 1909-1928," *Bulletin SIS* no. 59 (1998): 14–21. Van Hoorn focuses on the research performed under Lorentz' purview and the instruments used.
[125] Oosting to trustees of the Teyler Foundation, 30.06.1909, Haarlem, ATS, vol. 36.
[126] Meerburg to trustees of the Teyler Foundation, 03.07.1909, Haarlem, ATS, vol. 36 & Stoel to trustees of the Teyler Foundation, 04.07.1909, Haarlem, ATS, vol. 36. Copies of the replies they received: Trustees of the Teyler Foundation to Meerburg, 10.07.1909, Haarlem, ATS, vol. 57, fol. 72 & Trustees of the Teyler Foundation to Stoel", 10.07.1909, Haarlem, ATS, vol. 57, fol. 73. Further letters of inquiry have been preserved in ATS, vol. 36, some of the replies they received in ATS, vol 57.
[127] "Over de vacature conservator Physisch Kabinet zal advies worden gevraagd aan prof. Lorentz te Leiden, bij welke gelegenheid dien hoogleraar zal worden gevraagd of hij genegen is zelf de betrekking te aanvaarden": "Directienotulen", 28.07.1909, Haarlem, ATS, vol. 13.
[128] Trustees of the Teyler Foundation to H.A. Lorentz, 28.07.1909, Haarlem, ATS, vol. 57, fol. 82.
[129] H.A. Lorentz to trustees of the Teyler Foundation, c. 30.07.1909, Haarlem, ATS, vol. 36.

place at the home of one of the trustees, Jan Adriaan Fontein, and the two men were to be joined by another trustee of the Teyler Foundation, Anthonie Wilhelm Thöne.[130]

The question of course arises why the trustees approached Lorentz, rather than anyone else. There was certainly no shortage of talented and internationally recognised physicists in the Netherlands at the time – the decades around 1900 have even summarily been described as the "Second Golden Age" of Dutch science – and Lorentz was one of the most prominent amongst them, respected not only as a brilliant physicist who had just won the Nobel Prize, but also as a person.

In a way, Lorentz' high reputation was probably one of the reasons the trustees decided to approach him. They saw themselves as heirs to an institution with a long-standing tradition as one of the nerve centres of Dutch science. What's more, because van der Ven had been more of a populariser of science than a researcher, and because he had been frail for much of his last years, the trustees must have felt it was time to re-establish Teylers' reputation in scientific circles. In an account of his first meeting with Thöne and Fontein, Lorentz wrote that his task at Teylers would be "[t]o turn T.[eylers] into a place where work of considerable importance is performed and from which a certain influence is exerted".[131] These are sure to have been the trustees' as much as his own words.

But circumstances suggest there was also a second aspect: Lorentz was deeply dissatisfied with his position in Leiden. The reason was, firstly, that he had no laboratory of his own – even though he had been appointed to the first chair of theoretical physics in the Netherlands, he would have liked to be able to perform the occasional experiment – and, secondly, that he was saddled with a high teaching burden which left hardly any time for his own research.[132] Both issues had a lot to do with his equally brilliant fellow physics professor (for experimental physics) in Leiden, Heike Kamerlingh Onnes. Kamerlingh Onnes was soon to receive his own Nobel Prize for liquefying helium, which he had succeeded in doing less than a year before van der Ven's death, on July 10th 1908. But Kamerlingh Onnes was also a gifted manager, the physical manifestation of which became the constant refurbishments and major extensions of the university physics laboratories in Leiden he repeatedly succeeded to gain funding for. It was not that Lorentz and Kamerlingh Onnes didn't get on – on the contrary – but somehow, despite the constant addition of work space, even a small laboratory exclusively for Lorentz' use never materialised. When he was offered a professorship without teaching duties at the University of Munich in 1905, he only stayed in Leiden because promises had been made to lighten his teaching burden. Although Johannes Petrus Kuenen was subsequently appointed professor of physics in order to assist Lorentz with his teaching, Lorentz still felt, in his own words, that "I may, it seems to me, regard matters in such a way

[130] Trustees of the Teyler Foundation to H.A. Lorentz, 02.08.1909, Haarlem, ATS, vol. 57, fol. 84.
[131] "T.[eylers] tot een plaats te maken, waar werk van eenige beteekenis gedaan wordt en van waar een zekere invloed uitgaat": H.A. Lorentz to J. Bosscha", c. 17.08.1909, Haarlem, ATS, vol. 183.
[132] See: Delft, *Freezing Physics: Heike Kamerlingh Onnes and the Quest for Cold*, 10:352–357.

that a change has only been brought about in the interest of the University, but in no way for me personally."[133]

For Lorentz, these are unusually strong words. Ever conciliatory and in full control of his emotions, his daughter describes how the issue of the two rooms being wrongly assigned "was not discussed." She adds: "My father preferred, rightly or wrongly, to keep his peace of mind rather than to create a disturbance unless it were strictly necessary."[134]

Either way, these circumstances would have made Lorentz especially receptive to what the trustees of the Teyler Foundation had to offer. But could they also have known about his situation? The evidence which indicates that in all likelihood they did, is the intimate involvement of Johannes Bosscha jr. in the negotiations preceding Lorentz' appointment. As Fontein later recalled, it was Bosscha "who showed the trustees Lorentz' path to Haarlem".[135] Recall that Bosscha was an acolyte of the former curator van der Willigen. At this point in time, Bosscha was the general secretary of the Holland Society of the Sciences, and had already offered Lorentz to succeed him in this post in 1908, in an attempt at providing Lorentz with a graceful exit from Leiden and to relieve him of his teaching obligations.[136] The two men had known each other for a long time and respected each other deeply. Bosscha lived in Heemstede, near Haarlem, where the Holland Society was based, across the street from Teylers Museum. Fontein was a member of the Holland Society.[137] So multiple channels of communication were open, and as a letter from Bosscha to Lorentz reveals, they were used, too: just days after the first meeting between Thöne, Fontein and Lorentz, Johannes Bosscha writes to Lorentz reporting that he had met "his friend Fontein" during an evening stroll along the beach to enjoy "the beautiful sunset", and that Fontein had told him about the meeting at his home. Bosscha is joyous that "you are seriously considering Teylers' proposals", and then revealingly adds – not without apologising – "I already knew of them, but was not allowed to speak about them, when I received your pleasant visit."[138] Unsurprisingly, Bosscha then strongly advises Lorentz to take up the position offered, praising the clean air in Haarlem as a great advantage not only for the family.

At any rate Lorentz had obviously begun seriously considering accepting the offer to succeed van der Ven, starting a round of four months' negotiating with the trustees, even though as far as they were concerned, there was little to negotiate about. In their enthusiasm – probably Fontein's above all – they essentially agreed to everything Lorentz proposed. Yet as was already mentioned in the introductory remarks to this chapter, the trustees were not all equally

[133] "ik mag het, dunkt mij, zoo beschouwen dat er alleen ten behoeve van de Universiteit en geenszins voor mij persoonlijk eene verandering is gekomen": H.A. Lorentz to J. Bosscha", c. 17.08.1909, Haarlem, ATS, vol. 183.
[134] Geertruida Luberta de Haas-Lorentz, ed., *H.A. Lorentz: Impressions of His Life and Work.* (Amsterdam: North-Holland Pub. Co., 1957), 98.
[135] "die voor Lorentz, den weg naar Haarlem aan Directeuren heeft gewezen": "Directienotulen", 17.02.1928, Haarlem, ATS, vol. 15.
[136] H.A. Lorentz to J. Bosscha, c. 17.08.1909, Haarlem, ATS, vol. 183.
[137] Johan A. Bierens de Haan, *De Hollandsche Maatschappij der Wetenschappen, 1752-1952* (Haarlem: Tjeenk Willink & Zoon, 1970), 383.
[138] "gij Teylers voorstellen in ernstige overweging neemt" / "Ik wist er reeds van, maar mocht er niet van spreken, toen ik uw aangenaam bezoek ontving": J. Bosscha to H.A. Lorentz, 11.08.1909, Haarlem, ATS, vol. 183.

enthusiastic: already during the very first meeting at which approaching Lorentz had been discussed, two of the trustees had voiced fears that the Foundation's financial muscle was not enough to afford such a prestigious successor to van der Ven – although they were quick to add that, otherwise, they were "very taken with the concept of associating prof. Lorentz with the Foundation".[139] These two were Pieter Loosjes and Louis Paul Zocher. Four months later, Loosjes doubts had been alleviated, but Zocher still had it recorded in the minutes that he objected to Lorentz being taken on.[140] Again, he added, purely on financial grounds.

To Lorentz and Bosscha it was as yet inconceivable that the Teyler Foundation's resources were not unlimited. When Lorentz confessed that he would feel uneasy in accepting an offer Fontein had made, namely that he was to continue to receive his full salary even in retirement, Bosscha replied that Teylers was "wealthy enough" to be able to pay him and a successor a full salary for some years.[141]

Zocher's qualms later proved not to be unfounded, but in 1909, Fontein's enthusiasm went unabated, and everything was done to entice Lorentz to come to Haarlem. Besides the problems irritating him in Leiden that were mentioned above, Lorentz was tempted for three reasons. Firstly, he repeatedly stated that he would be happy to work for a "Dutch" institution with such a rich heritage as the Teyler Foundation.[142] Secondly, he told Bosscha that it was "tempting, before it is too late to do so, to take a slightly different path [professionally], on which I might possibly be able to work more fruitfully than in […] my current position."[143] And thirdly, he must have thought he might be more productive in Haarlem than he was in his "current position" because he had access to a laboratory of his own, could edit the Foundation's small scientific journal, the *Archives du Musée Teyler*, and all the time would essentially be his own boss, having to answer only to the trustees – who were obviously eager to support him wherever they could.

Yet he had some worries as well. The first was that he felt there was no appropriate successor for him in Leiden yet. He granted that "there are indeed some promising young folk, but it is precisely over the course of the next few years that it shall have to transpire what they are really capable of."[144] His second worry was that he could forfeit his rights to the considerable government pension which he would only receive if he worked at a university and remained in government service right up until his retirement age of 65, which would have been in 1918. Although he doubted that, after 31 years of service, both the university and the government

[139] "zeer ingenomen met het denkbeeld prof. Lorentz aan de Stichting te verbinden": "Directienotulen", 28.07.1909, Haarlem, ATS, vol. 13.
[140] "Directienotulen", 10.12.1909, Haarlem, ATS, vol. 13.
[141] "vermogend genoeg": J. Bosscha to H.A. Lorentz, 17.08.1909, Haarlem, ATS, vol. 193.
[142] He speaks of "eene zoo echt Nederlandsche instelling als T."in: H.A. Lorentz to J. Bosscha, c. 17.08.1909, Haarlem, ATS, vol. 183; the same phrase is used in: H.A. Lorentz to trustees of the Teyler Foundation, 25.08.1909, Haarlem, ATS, vol. 36.
[143] "verlokkend, vóór het daartoe te laat wordt, nog eens een ietwat andere richting in te slaan, waarin ik misschien met meer vrucht zou kunnen werkzaam zijn dan in […] mijne tegenwoordige positie.": H.A. Lorentz to J. Bosscha, c. 17.08.1909, Haarlem, ATS, vol. 183.
[144] "Er zijn wel een paar veelbelovende jongelui, maar juist in de eerstvolgende jaren zal moeten blijken wat zij kunnen presteren.": H.A. Lorentz to J. Bosscha, c. 17.08.1909, Haarlem, ATS, vol. 183.

would create unnecessary difficulties in this respect, he did want this to be resolved in an orderly fashion.

Having weighed all the pros and cons for about three weeks (Fontein had told him he could take all the time he wanted), Lorentz then wrote to the trustees.[145] As a solution to his worries he suggested a transitionary phase of three to four years in which he would already place himself at the Foundation's disposal, but stay on in Leiden as a full professor until the question of his succession had been resolved. After that, he would stay on as an honorary professor or a normal lecturer at the university in order to secure his pension, but move to Haarlem and consider the Foundation his primary employer. During this transitionary phase, the salary he received from the Foundation did not have to be a full one.

Lorentz then went on to explain how he would define his tasks at Teylers, should he be taken on by the Foundation. His first concern was the laboratory, which he wrote "must not be neglected", but used for the preparation of lectures and "to no lesser degree, [be] a place where scientific research is performed."[146] Interestingly, he then stated that the trustees were surely aware that, thus far, he had concerned himself more with theoretical rather than experimental work. Although he wanted to remain in overall charge of the activities at the laboratory and conduct the occasional experiment himself, he also stated that he could not oversee the day-to-day running of the laboratory, and therefore proposed that an assistant be taken on, preferably "a young, promising physicist [...] who has already earned his spurs, and who has shown that he can work on his own, so that I could, not only during the years I would still spend in Leiden, but also later, leave the laboratory almost entirely to him."[147] This young physicist could receive the title "conservator", as assistant professors at universities then did, and also receive a comparative salary.

Together, Lorentz continued, they could then run Teylers like a Dutch equivalent to the Royal Institution in London. They would take care of the instrument collection (referred to as "the cabinet"), perform research in the laboratory and assist external researchers who might want to use the research facilities, give lectures and courses for the general public as well as science teachers, and edit the *Archives*.

Finally, Lorentz still pointed out that implementing his ideas could be costly, as the refurbishment of the laboratory as well as the conservator's salary would incur extra costs. But the trustees were unperturbed. They arranged for another meeting with Lorentz on October 27th, and although no minutes of the meeting were taken or have been preserved, it is clear from their subsequent correspondence with Lorentz, and Lorentz' with Bosscha, that the trustees had gone along with all of Lorentz' proposals, and Lorentz had tentatively committed himself to working for the Foundation. All he still wanted to do was personally inform his

[145] For Fontein's offer see: H.A. Lorentz to J. Bosscha, c. 17.08.1909, Haarlem, ATS, vol. 183.
[146] "Het laboratorium van "Teyler"mag niet worden verwaarloosd." / "vooral niet minder, een plaats zijn, waar wetenschappelijk onderzoek verricht wordt.": H.A. Lorentz to trustees of the Teyler Foundation, 25.08.1909, Haarlem, ATS, vol. 36.
[147] "een jong, veelbelovend physicus […] die zijne sporen reeds verdiend heeft, en die getoond heeft, zelfstandig te kunnen werken, zoodat ik hem, niet alleen in de jaren die ik nog te Leiden zou doorbrengen, maar ook later, het laboratorium zo goed als geheel zou kunnen overlaten."

colleagues in Leiden and the board of the faculty of his plans to leave them. He reassured the trustees that their reaction would, however, have no impact on his decision to come and work for the Foundation.

One interesting point he still brings up is a suggestion by Herman Haga to turn the laboratory at Teylers into a Dutch equivalent of the Physikalisch Technische Reichsanstalt in Berlin, which would have meant it would calibrate all instruments in the Netherlands. Lorentz himself was only lukewarm about the idea, and it never materialised.[148] Incidentally, recall that Haga had himself applied for the post of curator after van der Willigen had died.

A final meeting was scheduled for November 18th in Haarlem to agree on contractual details. Lorentz gave his assessment of the laboratory he was to be made the head of (he had inspected it some days earlier), and reported that he had come to the conclusion that although a refurbishment was necessary, a new building was not – at least not for another 20 to 25 years. Once that period of time had passed, the new laboratory space could be created in an adjacent building. As for his title, "professor", "consultant" and "advisor" were floated, but the title "curator" was eventually agreed upon. So Lorentz was to be the "curator" of the Foundation's laboratory, and his assistant the "conservator". Lorentz agreed to draw up a list of possible assistants as soon as possible.

Lorentz set to work doing so over the course of the following weeks, and on December 9th he suggested Gerhard Johan Elias, who at that point was working in Berlin with Henri du Bois, assisting him in his magneto-optical research.[149] Lorentz wrote that he was an excellent candidate both because he had gained a lot of experience in running a laboratory in Berlin, and because magneto-optical research was what Lorentz intended to focus on in Haarlem. Just as interesting, however, is the list of candidates that either refused the job or who Lorentz rejected. His first choice, the director of the Royal Magnetic and Meteorological Observatory in Batavia, Willem van Bemmelen, refused to leave the Dutch Colonies unless he could get a significant pay rise. Chemists on the other hand Lorentz did not take into consideration because he wanted to run a physics laboratory. He did seriously consider choosing an assistant from a long list of science teachers at polytechnics around Haarlem – most of them were well educated and had ample experience in running their schools' laboratories. And finally, he decided not to take on Wander Johannes de Haas, even though he was a promising candidate, because he had only just completed his studies and not obtained his PhD yet.

The trustees did not doubt Lorentz' recommendation, and on December 10th 1909, the decision was taken to appoint both Lorentz and Elias as curator and conservator of the laboratory of the Teyler Foundation respectively.[150] Their tenure was to begin on January 1st 1910, although it soon transpired that Elias could not leave Berlin so quickly.

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[148] Lorentz to trustees of the Teyler Foundation, 04.11.1909, Haarlem ATS, vol. 36. Together with Kamerlingh Onnes and Bosscha, Haga had earlier suggested that this task was to be performed by HBS-teachers across the country. See: Frans van Lunteren, "'Van meten tot weten': De opkomst der experimentele fysica aan de Nederlandse universiteiten in de negentiende eeuw," *Gewina* 18, no. 2 (1995): 102–103.
[149] Lorentz to trustees of the Teyler Foundation, 09.12.1909, Haarlem, ATS, vol. 36.
[150] "Directienotulen", 10.12.1909, Haarlem, ATS, vol. 13.

Until he gave up his full professorship in Leiden, Lorentz was now to receive an annual salary of f2000,-. Once he had come to Haarlem, this was to be raised to f5000,-. An additional f10.000,- per year were reserved for what was referred to as the "cabinet", which in this case meant everything that fell under Lorentz' purview. This included the conservator's annual salary, which was gradually to rise to f3000,-, as well as an extra f3000,- for any equipment for the laboratory, f1000,- for the laboratory attendant (*amanuensis*) van Waveren who had already worked with van der Ven, f2000,- for the publication of the *Archives*, and finally f1000,- for lectures and courses.

It was at this meeting that Zocher objected to Lorentz' appointment for a second time, because of the costs involved. Van der Ven had received an annual salary of about f3000,- and a far smaller budget for all the costs he incurred. And not only was what Lorentz was eventually paid significantly more than what his predecessor had received, but the costs were even higher than the initial estimate Zocher and Loosjes had objected to four months earlier. The final bill was so much higher mainly because the initial estimate had not included a well-educated assistant. Some ten years later, Zocher's premonitions proved to have been correct.

3. Refurbishment of the Laboratory and Subsequent Research

The first indication that the Foundation's budget might be stretched to the limit came even before the new curator and conservator were officially appointed, on December 24th 1909. Lorentz had asked whether he could participate in a meeting of the trustees in order to relay some points he had discussed with his new assistant.[151] First of all, Elias could not leave Berlin as quickly as the trustees had hoped, because he wanted to complete a series of experiments he had been performing with Henri du Bois. With the trustees' blessing he eventually arrived in Haarlem in April 1910. But in addition to this, Elias had drawn up some plans for changes to the laboratory, and, as was to be expected, they came at a cost. The estimate Elias and Lorentz gave the trustees was about f9000,- spread over a couple of years. Although Elias considered the laboratory "very suitable", he did want to have "a few minor things" installed, as Lorentz put it, such as running water, gas, and a fume cupboard. The trustees "considered such reasonable", and Lorentz then suggested ways of economising in order to obtain the f9000,- required. The trustees were quick to remark that "the calculation of prof. Lorentz does not add up entirely", for the simple reason that they did not want to save f2000,- in one year by not publishing a volume of the *Archives*, but Elias was given the green light to go ahead with his plans for refurbishing the laboratory.[152]

By April 1911, van der Ven would probably have hardly recognised his former work environment. While Lorentz was still in Leiden, Elias and the laboratory attendant van

[151] Lorentz to trustees of the Teyler Foundation, 22.12.1909, Haarlem, ATS, vol. 36.
[152] "zeer bruikbaar" / "eenige kleinigheden" / "achtten zulks billijk" / "de berekening van Prof. Lorentz niet geheel opgaat": "Directienotulen", 24.12.1909, Haarlem, ATS, vol. 13.

Waveren had overseen the laboratory's refurbishment. Electric lights had been installed everywhere, and most rooms were provided with running water and gas.[153] All the walls had been plastered and painted, and fire doors installed. In order to prevent any possibility of fire spreading to the museum, the door connecting the museum building and the laboratory had been sealed off. A whole range of instruments and machines as well as laboratory equipment had been acquired as well.

Lorentz and Elias now had a total of nine rooms at their disposal, six of which were spread over the three storeys of two formerly separate houses adjacent to the museum that had already been conjoined to form the laboratory building during van der Ven's times. The ground floor consisted of two rooms, the so-called "large downstairs workroom" and a workshop for van Waveren. A one-metre thick concrete slab had been installed in the large workroom under some removable floorboards, so that instruments could be set up on it in order to minimise any interference of vibrations with measurements. The fume cupboard was installed in this room as well, and all of the laboratory's electricity was controlled through a large switchboard set up here. The workshop was equipped with a lathe and a workbench, amongst other equipment and tools. By 1912, Lorentz proudly proclaimed that "only for harder jobs it is occasionally necessary to turn to other workshops."[154] Over the years van Waveren built or improved upon a wide range of instruments with the tools available in his workshop.

The second floor consisted of three rooms: firstly an office for Lorentz, which for some reason he always referred to in inverted commas; secondly another workroom, the referred to as "the large upstairs workroom"; and thirdly a small room that was referred to as the "small upstairs chamber". This chamber was used as storage space, at least initially.

On the third floor, the top story of one of the two houses that had been conjoined was converted into a dark room to develop photographs.

Finally, there were two –or, depending on how one counts even three – other buildings associated with the laboratory, providing the remaining three out of the total of nine rooms. The first of these buildings was van der Willigen's "Observatory", essentially consisting of one room. It was not used for scientific purposes during Lorentz' tenure, but must at some point have been converted into a studio to be used by the curator of the art collections. The last of the instruments that had still been stored there were transferred to the "Museum" by 1912.[155] Lorentz suggested that same year that, should it eventually prove necessary, additional space for laboratory work could be created by extending the Observatory.

The second building was referred to as the "acids house" (*zuurhuisje*). It is not clear whether this was indeed a separate building, or part of an adjacent building. It consisted of two sections or rooms, one of which housed a 12hp engine to convert electricity (this indicates

[153] Unless otherwise indicated, the information presented in the following section is taken from Lorentz' annual reports to the trustees of the Teyler Foundation: "Verslagen", 1885-1944, Haarlem, ATS, vol. 191.
[154] "alleen for zwarder werk is het in sommige gevallen noodig zich tot andere werkplaatsen te wenden.": "Jaarverslag 1911-1912", 06.04.1912, Haarlem, ATS, vol. 191.
[155] "Jaarverslag 1911-1912", 06.04.1912, Haarlem, ATS, vol. 191.

that it can't have been too far away from the laboratory itself), the other of which was furnished as a chemical laboratory.

Not all of these rooms were used exclusively by those permanently employed by the Foundation (van Waveren later took two of his sons on as apprentices). On the contrary, over the years a whole range of guests made use of the facilities, some even for a period of several years, for their own research.[156] This is also why one could argue that the last building in which research was performed did not necessarily belong to the laboratory itself: in 1912 what is referred to as the "garden house" (*tuinhuisje*) was equipped so that Anton Hendrik Blaauw could conduct a series of experiments to find out more "about the influence of radiation on the growth phenomena of plants".[157] No record indicating that any of the conservators ever worked there as well has been preserved, although no resources or efforts were spared by both Elias and van Waveren to assist Blaauw. Especially van Waveren spent a lot of time on Blaauw's equipment, prompting the author of Blaauw's obituary some thirty years later still to refer to at least one "beautiful instrument" that Blaauw had been able to use in Haarlem.[158]

The *zuurhuisje*, too, was placed at the disposal of another guest researcher between 1913 and 1916, the geologist Christoph Georg Sigismund Sandberg, for some work on "questions of dynamic geology".[159] The trustees only agreed to this under the condition that "suchlike does not entail any significant costs".[160] Lorentz saw to it that he was provided with all necessary equipment, assuring the trustees that he had made it clear that Sandberg could only expect financial support for everything that "[can] be considered to form part of the equipment of a scientific [*natuurkundig*] laboratory".[161] Sandberg's research in Haarlem doesn't appear to have resulted in any publications, although he gained some notoriety later for his autobiographical account of his times in the Dutch Colonies, and as an anti-semite and supporter of the German Nazi party.

The same year that Sandberg arrived, the darkroom on the top floor of the laboratory was converted into a room for the linguistic research of a Mrs. Bakker, later referred to as Mrs. Bakker-Bezemer. She needed a place to analyse recordings she had made in Utrecht, and was

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[156] Meanwhile, the completely separate palaeontological and mineralogical collections were administered by another eminent, internationally respected, if perhaps also controversial, scientist: Eugène Dubois. Dubois' claim to fame was the discovery of what he deemed to be remains of a "missing link" between humans and ape-like ancestors, which he named *Pithecanthropus erectus*. He succeeded Winkler as curator in 1899 and stayed on until after Lorentz' death. On Winkler and the discussions surrounding his work see: Bert Theunissen, *Eugène Dubois and the Ape-man from Java: The History of the First Missing Link and Its Discoverer* (Dordrecht; Boston: Kluwer Academic Publishers, 1989). For a popular but well-researched account of Dubois' life see: Pat Shipman, *The Man Who Found the Missing Link: The Extraordinary Life of Eugène Dubois* (London: Weidenfeld & Nicolson, 2001).

[157] "over den invloed van bestraling op de groeiverschijnselen bij planten": "Jaarverslag 1913-1914", 08.04.1914, Haarlem, ATS, vol. 191.

[158] "fraai instrument": W.H. Arisz, "Levensberigt A.H. Blaauw," in *Jaarboek der Nederlandsche Akademie van Wetenschappen* (Amsterdam: Noord-Hollandsche Uitgevers, 1943), 231.

[159] "vraagstukken der dynamische geologie": "Jaarverslag 1913-1914", 08.04.1914, Haarlem, ATS, vol. 191.

[160] "zulks geen kosten van beteekenis mede brengt": "Directienotulen", 06.06.1913, Haarlem, ATS, vol. 13.

[161] "gerekend [kan] worden tot de uitrusting van een natuurkundig laboratorium de behooren": "Jaarverslag 1913-1914", 08.04.1914, Haarlem, ATS, vol. 191.

provided with the necessary equipment from Teylers instrument collection. She stayed on until 1916, from which point on she was evidently able to work at home.

As from 1919, the former darkroom was occupied by Dr. M.J. Huizinga two afternoons every week. Huizinga was a maths teacher interested in "questions that arise from current conduction through flames".[162] Before he left in 1920 he might still have met the engineer G.F. van Dissel, who wanted to learn more about electromagnetic waves because he wanted to specialise in wireless telegraphy. An announcement in the *Indische Courant* of 1929 seems to suggest that he successfully pursued a career along these lines.[163]

But even though guests that only passed by for assistance have not been included in the list above, and Huizinga's presence even prompted Lorentz to start holding monthly colloquia attended by other maths and science teachers from the Haarlem area, the laboratory was still first and foremost his and the conservator's.

Elias himself avidly set to work once the laboratory had been refurbished and all his equipment had arrived and been installed. As was Lorentz' intention, most of Elias' work revolved around magneto-optic effects. De Haas assisted him in 1913 in performing a series of experiments on "the structure of absorption lines of sodium vapour".[164] And after Lorentz had been succeeded by Paul Ehrenfest in Leiden and subsequently moved to Haarlem in 1912, Elias assisted the curator in a series of experiments on a problem that the Nobel Prize laureate would repeatedly return to over the coming years, hysteresis.

But just as Elias' own efforts were gaining momentum after all the instruments had been delivered, assembled, and calibrated to his satisfaction, that momentum was checked through events far beyond his control, namely the outbreak of the First World War. And even though the Netherlands remained neutral, the effects were of course felt in Haarlem too, as everyone everywhere was forced to economise. Worst of all, Elias was called up for service in 1914. He was allowed to return after a few months, but it didn't take long for economising to take its toll. By the end of the War, Lorentz had stopped giving public lectures that were traditionally held in the winter, as the lecture hall could not be heated, because fuel was scarce. No new instruments were acquired either.

Elias left Teylers on August 8th 1916, after he was offered and accepted a position as honorary professor at the University of Delft (*Technische Hogeschool*). He would most likely have changed jobs even If the War hadn't been raging. Not only was the entire country including the University of Delft affected by the hostilities, but as early as March 1911 Elias had already accepted – with the trustees' blessing after Lorentz assured them that this would not detract from his work at Teylers – a teaching position in Utrecht, standing in for the frail Cornelis Harm Wind for two hours a week. The following year, Elias had been made an assistant professor (*privaatdocent*) in Utrecht.

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[162] "vragen, die zich bij de electriciteitsgeleiding door vlammen voordoen.": "Jaarverslag 1919-1920", 07.04.1920, Haarlem, ATS, vol. 191.
[163] "Een onderscheiding", in: *De Indische Courant 76*, 12.12.1929.
[164] "de structuur der absorptielijnen van natriumdamp": "Jaarverslag 1913-1914", 08.04.1914, Haarlem, ATS, vol. 191.

Elias exchanging his position at the laboratory in Haarlem for a position at a university was the first indication of a pattern that was to emerge over the course of the following years: all of Elias' successors as conservator lamented the absence of students in Haarlem or left once they were offered a position at a university. And the list of successors was not short, because most of the subsequent conservators did not remain in Haarlem for very long.

Elias was succeeded by de Haas, who had already been considered for the position in 1909, and in the meantime had received his doctorate. Although he left just a year later to join Elias as a professor of physics in Delft, he managed to recreate and describe more accurately than anyone else previously a physical phenomenon that has since been called the Einstein-de Haas effect. De Haas and the increasingly famous Einstein had first discovered this phenomenon while working together in Berlin. These credentials also go to show that de Haas' appointment had little, perhaps even nothing, to do with the fact that he had also become Lorentz' son-in-law in 1910.

After de Haas left, Lorentz employed Johannes Martinus Burgers, a recent graduate of Ehrenfest's with strong Marxist sympathies, on January 8th 1918.[165] Lorentz set him to work on a set of experiments related to his research on hysteresis. Burgers was only to complete these experiments "up to a certain level" though, as he was simultaneously granted time to edit his PhD-thesis and, like his predecessors in Haarlem, left for Delft after only ten months for a professorship of engineering.[166]

Lorentz then chose Balthasar van der Pol as the new conservator. At the time van der Pol was working in Cambridge at the Cavendish Laboratory as an assistant to J.J. Thomson. Lorentz allowed him to continue with his research into the propagation of electromagnetic waves which he had already begun in Cambridge, and van der Pol ordered some of the instruments he would require in Haarlem in England, subsequently having them delivered to the Netherlands. Interestingly, in his report to the trustees on van der Pol, Lorentz emphasised that his previous research had been conducted not with an eye to improving wireless telegraphy, but "the study of physical phenomena".[167] Until he left in late 1922 – for a position at the newly created industrial laboratory of the *Philips Gloeilampenfabriek* – van der Pol experimented a lot with recently developed triodes, focusing especially on cases of hysteresis. Meanwhile, Lorentz himself had succeeded in measuring a "curious double refraction in crystals of the regular system" which had been theoretically predicted, but never observed yet.[168]

Van der Pol was succeeded by Coster, who stayed for a little more than a year before leaving in 1924 for a professorship in Groningen. While in Haarlem, he experimented with X-rays. He was succeeded by Adriaan Fokker in July 1926.[169] Fokker had previously worked with

[165] On Burgers see: A.J.Q. Alkemade, "Burgers, Johannes Martinus," February 10, 2012, http://www.historici.nl/Onderzoek/Projecten/BWN/lemmata/bwn5/burgers. This is a digitized version of the entry on Burgers in the Biografisch Woordenboek van Nederland 5 (The Hague 2002).
[166] "tot op zekere hoogte": "Jaarverslag 1918-1919", 07.04.1919, Haarlem, ATS, vol. 191.
[167] "de bestudering der physische verschijnselen.": Ibid.
[168] "eigenaardige dubbele breking bij kristallen van het regulaire stelsel": Ibid.
[169] "Directienotulen", 09.07.1926, Haarlem, ATS, vol. 15.

Rutherford in Manchester and with Einstein in Zurich. Lorentz agreed with the trustees that Fokker could succeed Lorentz as curator. Together they turned towards questions pertaining to quantum mechanics, specifically the existence of light quanta, but their efforts were cut short when Lorentz passed away on February 4th 1928.

4. "The Isolation of Haarlem"

As has already been pointed out, all of the conservators – all of them obviously budding young physicists with great potential and future members of the elite of Dutch science – evidently considered universities a more challenging work environment with better career prospects than Teylers Laboratory. The question of why naturally arises.

Two points were certainly irrelevant, and a third was of little importance. Firstly, their leaving cannot have had anything to do with Lorentz' scientific credentials or his role as their superior. No incidence of any of the conservators speaking ill of Lorentz is known of. Secondly, the trustees were as supportive as they could be, and certainly didn't interfere with work at the laboratory. Their demands – that a number of lectures should be held annually – were minimal, and certainly not comparable with the burden of teaching at a university. Finally, the salary the Foundation paid was competitive as well, albeit considerably lower than a university professor's.[170]

Two other points however were of crucial importance: the changing nature of science, and, eventually, the Foundation's finances.

As for the first of these points, research was increasingly being conducted in large scale projects, requiring teams of scientists. Because of the larger scale of these projects, funding could increasingly only be provided by the government, industry, or perhaps major philanthropic organisations such as the Rockefeller and Carnegie Foundations. Eventually, a two-person, privately funded laboratory in a town such as Haarlem without a university, could no longer compete. Perhaps the best example of the changing dimensions and character of scientific research is the immense expansion of the facilities at Lorentz' own university, Leiden. As was already mentioned above, Kamerlingh Onnes had immediately set about refurbishing the laboratory he was provided with upon his appointment in 1882; but during the years Lorentz spent in Haarlem, the physics department's premises were significantly extended upon Kamerlingh Onnes' initiative, with a major new wing being added to the original building between 1920 and 1926.[171] Lorentz' laboratory in Haarlem paled in comparison. And even if the Teyler Foundation would have had the resources to expand its own premises, it would have faced another obstacle: Pieter Teyler's old town house was

[170] The salary for a full professorship was about f6000,- p.a., the conservator earned about f3000,- p.a.
[171] On this see: Delft, *Freezing Physics: Heike Kamerlingh Onnes and the Quest for Cold*, 10:530ff.

situated in what had now become the middle of town, and the space around it was obviously limited, all the more so because tearing down the museum was out of the question.

As scientific research became large-scale, research networks became increasingly important as well, especially as specialisation amongst experts increased too. As Ehrenfest demonstrated through his infamous colloquia in Leiden, students could provide a valuable stimulus to research as well as a reservoir of future research talent, all the more so as their number increased significantly over the first decades of the 20th century. This is where another character trait of Lorentz' becomes significant: he was not a natural-born charismatic leader with instincts of power. This in turn meant he was not the type to establish a scientific "school" of his own. Where he displayed leadership, it was more on a rational level, out of a sense of duty when jobs had to be done or problems solved. It should be emphasised that this is not to say that his word did not carry immense weight, or that he was not respected, that he did not stimulate exchanges amongst scientists, or that he did not nurture students' talent. On the contrary, as his pivotal involvement and presidency of the Solvay conferences for instance shows, as well as his commitment to his own students and matters of education in general. But the contrast with Ehrenfest for instance already did not escape contemporaries. As Lorentz' daughter put it:

"How great a difference between Ehrenfest and Lorentz as regards their relationship to their students and the influence which they exercised upon them! Whenever Ehrenfest met a young man in whom he saw great possibilities as far as physics was concerned, but who spent too much time and energy on other things, he would spare time nor effort to influence him to take up the study of physics seriously. Lorentz, facing the same situation, would regret the fact, but would come to the conclusion that, for better or for worse, this young man was more interested in other matters than in physics, and that this was his own business. Only when a student asked for help, or was in need of his assistance, on account of illness or similar circumstances, would Lorentz be ready to offer help."[172]

Or, as Fokker later remembered during an interview:

"[Lorentz] was very, very kind, and his conversation was never dull although he was quiet. But he didn't make an appeal on your soul, so to speak, you see; he just left you to your own intentions and to your own desires. And that's not the way to make a school; if you are making a school, you must just shake people, you see. The same thing I noticed later when I talked with Rutherford -- I was some weeks with Rutherford. There's a great difference; it's a pity that Lorentz did not have a school around him just like Ehrenfest."[173]

So Lorentz' style did not help establish Haarlem as one of the nerve centres of Dutch science in the sense that Lorentz brilliance and high reputation was not enough to compensate what was beginning to emerge as a structural disadvantage, i.e. the relatively small size of Teylers Laboratory and Haarlem's lack of a university. This was amplified by two factors: firstly that Lorentz stayed on in Leiden as an honorary professor, giving his legendary "Monday morning

[172] Haas-Lorentz, *H.A. Lorentz: Impressions of His Life and Work.*, 107. Original in English.
[173] Transcript of an interview John L. Heilbron held with Fokker at Beekbergen, 01.04.1963: http://www.aip.org/history/ohilist/4607.html, accessed 07.02.2012.

lectures" even after he had officially reached retirement age; and secondly his time-consuming involvement with – and later presidency of – the so-called "Zuiderzee-committee" (*Staatscommissie Zuiderzee*), which had been established to calculate what effect the construction of the *Afsluitdijk*, an enormous enclosure dam in the province of Friesland, would have on the water level and pressure on the surrounding dams. Lorentz developed a theoretical model to simulate the hydrodynamics involved, and oversaw the subsequent immense calculations this required.[174]

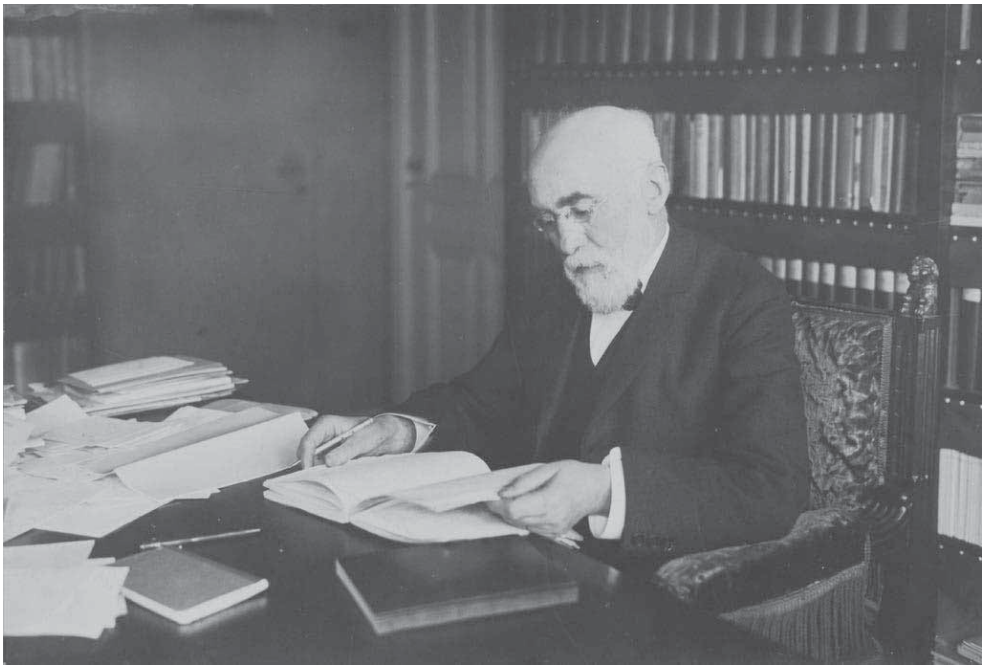

Fig.10. Hendrik Antoon Lorentz (1853-1928) in his private study in Haarlem, 1926 (Teylers Museum, Haarlem)

As some of their correspondence shows, the conservators were beginning to feel this isolation. In 1922 for instance Van der Pol wrote to Lorentz, who was abroad at the time,

"At Teylers it is quiet and lonely. Only now that you are gone I realise, actually for the first time, what is means to work in a town in which there is no university life."[175]

A year later, van der Pol left for Eindhoven. And when Lorentz turned to Fokker to ask him whether he might want to take up the post of conservator, Fokker had grave doubts about his

[174] See Anne J. Kox, "Uit de hand gelopen onderzoek in opdracht: H.A. Lorentz' werk in de Zuiderzeecommissie," in *Onderzoek in opdracht: de publieke functie van het universitaire onderzoek in Nederland sedert 1876*, ed. Leen Dorsman and Peter J. Knegtmans (Hilversum: Verloren, 2007), 39–52.

[175] "Op Teyler is het stil en eenzaam. Nu U weg is besef ik pas, eigenlyk voor het eerst, wat het zeggen wil, in een stad de werken waar geen universitair leven is.": B. Van der Pol to H.A. Lorentz, 15.03.1922, Haarlem, NHA, Archief Lorentz, vol. 364, nr. 62.

own qualifications, citing Haarlem's isolated position as the main reason he would prefer to take up an alternative offer he had received from the University of Delft:

"Without question there is very much that is great about a private Foundation [the Teyler Foundation] that wants its resources to serve science, and to ensure that these great intentions are done justice and developed even further is a tempting task. I also understand very well that many things could perhaps be done for the general cause of all physicists by someone who is not burdened by other duties of his position, with regards to cooperation on a national level as well as for international relations. But this is an ambition that aims high, to attract those members of the scientific circle of friends for regular interaction. In order to break the isolation [*isolement*] of Haarlem a lot of friendship will be necessary, and a certain amount of authority. Following this line of thought it then seems again as if I needed to earn my spurs in Delft first, and become familiar with the nature of and [… unreadable] of relations."[176]

In other words, "the isolation of Haarlem" weighed more heavily than the absence of any teaching obligations at Teylers and the possibility to focus entirely on research.

By this time, the second aspect could no longer be ignored either: the Foundation's finances. The changes in the global economy were beginning to take their toll on the Foundation's budget, which of course had already been stretched to the limit when Lorentz was taken on. The War, inflation, the Russian Revolution, and the introduction of personal taxes all brought about change in the financial world during this time. When the trustees were looking for a successor to van der Pol, they therefore openly told Lorentz that they were "of the opinion that they would have to be prepared for a possible cave-in and significant loss of value of stocks".[177] They had already lost a lot of money as a result of the Russian Revolution, when the Russian government bonds they held became worthless. Even though the trustees were able to compensate for this loss by investing in Dutch companies and bonds, the financial markets were still far from stable.[178] The year Coster was taken on, 1923, was the year in which hyperinflation brought the young Weimar Republic to its knees. Lorentz accordingly warned Coster that he had to consider his new position a temporary one, as there was a possibility that the entire physics department would have to economise – small wonder Coster soon left for Groningen.[179]

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[176] "Ontegenzeggelijk is er erg veel moois in een particuliere Stichting [Teylers], die haar middelen aan de wetenschap wil dienstbaar maken, en om te zorgen dat dit mooie der bedoeling tot zijn recht komt en nog verder ontwikkeld wordt is een aantrekkeljke taak. Ook zie ik heel wel in, dat er vele dingen wellicht te doen vallen voor de gemeene zaal der physici juist voor iemand, die geen drukke ambtsplichten heeft, zoowel voor de binnenlandsche vriendschappen als voor buitenlandsche verstandhouding. Maar het is een ambitie, die nogal hoog mikt, deze van een wetenschappelijken vriendenkring aan te trekken tot geregeld verkeer. Om het isolement van Haarlem te breken zal veel vriendschap noodig zijn, en een zeker gezag. In dezen gedachtengang lijkt het dan weer alsof ik in Delft eerst mijn sporen daartoe moet verdienen, en bekendheid verwerven met karakter en den binnenkant [?] van verhoudingen.": A. Fokker to H.A. Lorentz, 03.01.1923, Haarlem, NHA, Archief Lorentz, vol. 364, nr. 24.

[177] "van oordeel zijn dat zij rekening moeten houden met een mogelijke ineenstorting en waardevermindering van rentegevende papieren." This is the way Fokker quotes Lorentz, in: A. Fokker to Lorentz, 03.01.1923, Haarlem, NHA, Archief Lorentz, vol. 364, nr. 24.

[178] See the accountant's reports covering this period, in: "Rekeningen met Toelichting", 1889-1945, Haarlem, ATS, vol. 609. The worthless Russian bonds were kept: "Coupons", c.1917, Haarlem, ATS, vol. 2414.

[179] "Jaarverslag 1922-1923", 07.04.1923, Haarlem, ATS, vol. 191.

Interestingly, even well into the 1930s the Foundation had in fact not actually lost any of its capital, which, at about f2.000.000,- was still considerable.[180] But, crucially, the trustees were no longer able to gain much of a return on the assets they owned. The accountant's annual reports confirm what Fontein, by this time president of the board of trustees, pointed out in 1926: "that one needs to be very frugal in order to retain f10m [f10.000,-] at the end of each year, which is quite necessary".[181] By this time, he and his fellow members of the board were no less concerned than they had been after van der Pol left. It is worth recalling that the Foundation had a lot more to pay for than Lorentz' laboratory: all the other departments at the museum – the most costly of which for many years was the library –, the museum itself, the *Hofje*, the two learned societies, and a wide range of charities all required regular payments.

As was already mentioned in the introduction to this chapter, lengthy discussions on how to economise ensued, and during these discussions the idea to close down either the laboratory or the art department was even floated several times by different members of the board. It was finally decided that all the prints and drawings the Foundation owned in duplicate were to be sold off.[182] Sensing what else might still be coming, the curator of the art department, H. van Borssum Buisman, subsequently agreed to select prints and drawings that could be put on the market, but repeatedly protested heavily against any paintings being sold.[183] Lorentz himself also went on record protesting against other departments economising in order to maintain his own department's budget. But as Fokker soon noticed, all departments felt the squeeze, with the laboratory's annual budget being set at f14.000,- rather than the f17.000,- both Fokker and Lorentz considered necessary and had asked for.

So, in a way, it looked as if Zocher's premonitions about the Foundation's finances had been correct. Zocher himself had passed away in 1915. Yet Fontein's enthusiasm was never broken, he never showed any signs of regretting having taken on Lorentz. On the contrary, when Lorentz passed away, Fontein gave a small eulogy at the following meeting of the board of trustees, in which he spoke of Lorentz tenure and personality in no less than glowing terms. Acknowledging that Lorentz had not been able to perform as much research at Teylers as he had wanted to himself, Fontein nevertheless drew attention to the "successen" of the conservators, emphasised Lorentz' impeccable character and fine intellect, and proudly quoted Kamerlingh Onnes as having stated that the country should be eternally grateful to the Teyler Foundation because it had created a position for Lorentz in which he was free to focus exclusively on his research. But, Fontein continued, far more than the Foundation had been able to assist Lorentz, it had benefitted from his worldwide fame:

[180] "Rekeningen met Toelichting", 1889-1945, Haarlem, ATS, vol. 609.
[181] "dat men heel en heel zuinig moet zijn om jaarlijks f10m [f10.000,-] te kunnen overhouden wat toch noodzakelijk is.": "Directienotulen", 14.05.1926, Haarlem, ATS, vol. 15.
[182] "Directienotulen", 30.04.1926-11.06.1926, Haarlem, ATS, vol. 15.
[183] "Directienotulen", 14.05.1926, Haarlem, ATS, vol. 15, fol. 5 & fol. 9.

"On his great flight to world fame, which he never actively sought, but which simply came to him, he inadvertently took Teyler's Laboratory and all that accompanies it (including the entire Foundation) under his wing so that all would share in his world fame."[184]

Fontein's case can indeed be argued. Renowned colleagues of Lorentz' such as Einstein or du Bois for instance came to Haarlem and to Teylers because Lorentz worked there. As Lorentz noted in his 1917 annual report, "Prof. A. Einstein from Berlin and Prof. H. Du Bois showed their interest in the laboratory on their visits."[185] Other well-known scientists include van der Pol's visitor Appleton.

Yet at the same time, Kamerlingh Onnes' remark about the Teyler Foundation that Fontein referred to was the only reference made to this Haarlem institution in a total of 6 speeches held in Lorentz' honour during the festivities to mark the 50th anniversary of his doctorate in 1925.[186] This might have had something to do with the fact that these festivities were held at the University of Leiden, but that in itself is not insignificant: they were not held in Haarlem. The scientific community obviously still associated Lorentz with Leiden, more than with Haarlem.

Lorentz himself in fact regretted he had not been able to do more for the Teyler Foundation. At the height of the discussions on the Foundation's finances in May 1926, he summarised his own view of the previous one and a half decades. As the minutes of the meeting read:

"With regards to himself Prof. Lorentz states that his initial plans have not been fully implemented. Speaker [Lorentz] hasn't done for Teyler what he had wanted to. Numerous circumstances prevented him from doing so. Leiden did not let him go, the War claimed a lot of his time, as did peace. Then came the calculations for the Zuiderzee, etc. etc. Yet there is also reason to be satisfied." [187]

Before summarising Lorentz' ensuing account of everything that he thought did go well – above all Lorentz was proud of what the conservators had achieved – the trustee taking the minutes of the meeting still recorded verbatim Lorentz' very brief overall verdict of his tenure at Teylers, which, considering that Lorentz passed away less than two years later, has a final ring to it: "*Het is wel aardig gegaan*", which can be translated roughly as "It didn't go badly."

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[184] "Op zijne groote vlucht naar wereldberoemdheid, welke hij nooit gezocht heeft, doch die hem eenvoudig te gemoet is komen waaien, heeft hij onwillekeurig Teyler's Laboratorium met al zijn aanhang (waaronder de geheele Stichting) onder zijn arm medegenomen op dat dit alles in zijne wereldvermaardheid zoude deelen.": "Directienotulen", 17.02.1928, Haarlem, ATS, vol. 15.

[185] "Prof. A. Einstein te Berlijn en Prof. H. Du Bois toonden bij bezoeken hunne belangstelling in het laboratorium.": "Jaarverslag 1916-1917", 07.04.1917, Haarlem, ATS, vol. 191. This was one of at least two confirmed instances in which Einstein came to Leiden. The first was in 1911 (see below).

[186] At least this was the only time its name appears in the published versions of these speeches: W. de Sitter et al., "Huldiging van Professor Lorentz," *Physica: Nederlandsch Tijdschrift voor Natuurkunde* 6, no. 1 (1926): 1–21.

[187] "Op zich zelven komende verklaart Prof. Lorentz dat zijn plannen van vroeger helaas niet in elken deele verwezenlijkd zijn. Spreker heeft niet voor Teyler gedaan, wat hij had willen doen. Tal van omstandigheden hebben hem dat belet. Leiden liet hem niet los, de oorlog vroeg veel van zijn tijd even als de vrede. Toen kwamen de berekeningen voor de Zuiderzee enz. enz. Toch is er ook reden tot tevredenheid.": "Directienotulen", 14.05.1926, Haarlem, ATS, vol. 15.

5. The Museum Next Door

Let us briefly summarise some points that so far have transpired from the description of Lorentz' activities as curator of the Teyler Foundation's laboratory. Firstly, he was taken on largely because of the enthusiasm of one trustee, Jan Adriaan Fontein, and the mediation of another eminent scientist, Johannes Bosscha. Secondly, Lorentz accepted the job in Haarlem at least in part because he was dissatisfied with his situation at the University of Leiden. Thirdly, the Foundation's budget was stretched to the limit from the very beginning of Lorentz' tenure, and this situation became painfully acute after the Foundation experienced a variety of financial setbacks. Fourthly, this decline in the laboratory's fortunes was amplified by the rise of universities as research institutes, which was closely connected to the structural changes scientific research was experiencing. Research increasingly involved a team effort and sensitive, expensive measuring devices.

Thus far one could therefore conclude that hiring Lorentz was essentially a fateful attempt by the Teyler Foundation to maintain the position it had held throughout most of the 19th century, as the centre of Dutch experimental science. Two other aspects besides the Foundation's financial woes and Haarlem's increasingly peripheral status without a university contributed to this ill fate, i.e. the Foundation's laboratory being taken less and less seriously within the scientific community: firstly, even if the funds had been available it would have been almost impossible to expand the laboratory building to a scale comparable to university laboratories, simply because the laboratory was in the middle of Haarlem and adjacent to Teylers Museum. And secondly, despite his brilliance and immensely high reputation Lorentz did not possess the charisma needed to compensate for Haarlem's peripheral status.

As a result, by the time Lorentz passed away the Foundation was selling off those prints and drawings from its collection that it owned in duplicate in order to raise money.

This finally turns the spotlight back onto the museum, and is in fact remarkable – although not so much because of what was being sold, but because of what the Foundation was *not* selling: the trustees did not decide to sell any of the historical scientific instruments – which fell under Lorentz' purview as curator – from their collection in order to gain some fresh income. This is even more noteworthy than the fact that they didn't sell any of the books from the library, coins from the numismatic collection, or fossils and minerals from the geological collection, because all of these were either unique or could still serve for research purposes. The instruments were all unique too of course, whereas the duplicate drawings and prints were obviously not – but many of the instruments were no longer of any use in the laboratory, or would clearly never be again; they no longer had any practical value. Given that the Foundation's predominant aim was clearly to support research, it is therefore easily imaginable that someone at the time might have come up with the argument that the old and useless instruments should be the first to be sold from any of the collections in order to guarantee that further research could be funded by the Foundation.

The prioritisation in selling off duplicate works of art before historical scientific instruments is therefore strongly indicative of some sense of the historical value of these artefacts of former science. The trustees wanted to keep their museum of the history of science.

Yet the same time, what also transpires perfectly clearly from the analysis of Lorentz' and his assitants' activities at Teylers given above, is that as long as they were in charge of the scientific instrument collection they never made an active effort of highlighting it for its historical value; Lorentz' focal point was the laboratory, not the museum. On the contrary, from the few references he made to the museum or the collection at all, two points clearly transpire: firstly, that in his eyes the instrument collection served as a sort of reservoir of instruments which could be used for laboratory work, should they prove to be of any assistance; and secondly, that to him the museum and laboratory were separate entities.

This second point is most clearly illustrated by a card he sent to the curator of the art department, Johannes Frederik Hulk, when he was expecting a visit from Einstein and his wife. It read:

"Dear Mr. Hulk,

I hope to come to the museum tomorrow after coffee at about 2 o'clock with Mr. and Mrs. Einstein and we would greatly appreciate it, if we could see some things.

Yours respectfully, H.A. Lorentz"[188]

In other words, "after coffee", Einstein and Lorentz – curator of the physics department – wanted to go on what amounted to a guided tour of the adjacent Teylers Museum.

In his annual reports Lorentz repeatedly stated how he resorted to instruments from the museum's collection for use in the laboratory. The most prominent example was the conversion of a Repsold universal instrument that had been acquired by van der Ven's predecessor van der Willigen in 1878, into a multipurpose spectrometer. This conversion amounted to a total cost of f6316,-.[189] In 1912 Lorentz remarked that "a lamp of Duborcq, present in the museum, provided good service" during some of Elias' spectrographic experiments.[190] In 1914 he reported that equipment required by Mrs. Bakker "could be assembled with the help of some instruments from the collection".[191] And in 1923, when money was getting tight, Lorentz reported that only a few of the instruments required by Coster had had to be bought new because it had turned out that the laboratory was actually already well equipped for the purposes of his research, adding that some instruments had also

[188] "Zeer geachte heer Hulk, Ik hoop morgen na de koffie, tegen 2 uur met den Heer en Mevr. Einstein in het Museum te komen en wij zullen het dan zeer op prijs stellen, zoo wij wat mogen zien. Met vriendelijken groet hoogachtend Uw dienst. H.A. Lorentz": H.A. Lorentz to J.F. Hulk", 10.02.1911, Haarlem, ATS, vol. 124. I am grateful to Marijn van Hoorn for having drawn my attention to this letter.
[189] Hoorn, "The Physics Laboratory of the Teyler Foundation (Haarlem) Under Professor H.A. Lorentz, 1909-1928," 16.
[190] "Eene in het museum aanwezige lamp van Duborcq bewees […] goede diensten": "Jaarverslag 1911-1912", 06.04.1912, Haarlem, ATS, vol. 191.
[191] "kon met behulp van eenige in de verzameling aanwezige instrumenten worden samengesteld": "Jaarverslag 1913-1914", 08.04.1914, Haarlem, ATS, vol. 191.

been converted by van Waveren.[192] At the same time, instruments from the collection were repeatedly lent to external researchers for their experiments.

This is not to say that Lorentz looted the museum or didn't take care of the instruments that were housed there. On the contrary, his annual reports also reveal that van Waveren and his apprentice son spent time cleaning both the instruments and the showcases they were stored in. In 1912 for instance Lorentz reported that "a number of old instruments, such as an electromagnet, a set of scales and a hot-air machine, were completely cleaned, checked up and revarnished."[193] In 1917 he wrote that "much care was also devoted to the cleaning of cupboards and instruments in the Museum and the restoration [*herstellen*] of some old apparatus."[194] One year later, Lorentz reported again that "the first and second amanuensis [van Waveren and his apprentice] spent a lot of time checking and restoring instruments from the Museum".[195] It says a lot though that these thorough cleaning and repair jobs were undertaken towards the end of World War I, when no new instruments were being bought and research and other activities had been reduced to a minimum because of the fuel shortage. Again, it becomes clear that Lorentz' focal point at Teylers was the laboratory, and that he possibly didn't even recognise the museum's potential as a showcase for the history of science, alongside all the other collections that were being rediscovered throughout Europe precisely during Lorentz' tenure at Teylers.

At the same time however this also meant that, in principle, the original museum remained untouched and unchanged for another two decades. By the time Lorentz passed away, the Oval Room in particular clearly belonged to another era entirely, and the 1885 extension was more than 40 years old already too. Just five years after Lorentz' death Fokker published a new guidebook to the instrument collection, with a strong emphasis on the rich history it illustrated. Significantly, he placed a far stronger emphasis on the collection's history than van der Ven had in his guidebook. And in this sense it is also not surprising and maybe even symbolic that when Fokker's successor Jacob Kistemaker arrived in Haarlem in 1955 and the trustees took the decision no longer to continue funding research at Teylers, he dismantled all of Lorentz' laboratory and sold all the instruments that it contained – but didn't touch any part of the museum.

One could therefore conclude that on the one hand Lorentz' tenure as curator at Teylers marked the end of an era: the era of the Teyler Foundation's role as one of the most important, perhaps even the most important, patron of experimental research in the Netherlands. But on the other hand, because of events surrounding his tenureship and the fact that he took little active interest in Teylers Museum, the Foundation and its museum were soon able to take on a new role as beacons of the history of science.

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[192] "Jaarverslag 1923-1924", 31.03.1924, Haarlem, ATS, vol. 191.
[193] "Enkele oude instrumenten, als electromagnet, balans en heetelucht-machine, werden geheel gereinigd, nagezien en opnieuw gevernist.": "Jaarverslag 1911-1912", 06.04.1912, Haarlem, ATS, vol. 191.
[194] "veel zorg werd ook bested aan het schoonmaken van kasten en instrumenten in het Museum en het herstellen van eenige oude apparaten.": "Jaarverslag 1916-1917", 07.04.1917, Haarlem, ATS, vol. 191.
[195] "de eerste en tweede amanuensis [hebben] veel tijd besteed aan het nazien en herstellen van instrumenten uit het Museum": "Jaarverslag 1917-1918", 07.04.1918, Haarlem, ATS, vol. 191.