De verzamelwoede van Martinus van Marum (1750-1837) en de ouderdom van de aarde. Herkomst en functie van het Paleontologisch en Mineralogisch Kabinet van Teylers Museum

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Questions and answers

The central cabinets in the Oval Room contain the nucleus of the Teylers mineralogy collection. Some parts of the interior still date from the days of Martinus van Marum. In the storage facility lie tens of thousands of other rocks and minerals belonging to the Palaeontology and Mineralogy Collection. Some would not stand out in a gravel path. But combined with the thousands of handwritten labels that have been preserved, most of which date from the 18th century, they are silent witnesses to a largely forgotten world of collecting practices, classifications, academic networks, commercial practices, debates on the nature of fossils and the formation of the earth's crust, and much more besides. My research has been an attempt to reveal the world behind these objects, all of which were once collected for Teylers Museum by Martinus van Marum. It seeks to give the collection back its voice. Combining the financial records of the Teylers Foundation with the minutes of meetings held by the directors and Teylers's Second Society, as well as Van Marum's travel journals, written records of public lectures, correspondence, and other manuscripts made it possible to reconstruct his purchases and to match labels to objects.

My studies of the palaeontology and mineralogy collections of Teylers Museum also shed fresh light on the acquisition and composition of collections of this kind in a more general sense. Recent years have witnessed a surge of interest among science historians in naturalia and other material objects related to scholarship, as well as in collection building in this field. Such objects languished in neglect for decades, partly because the initial emphasis in the history of science was on the experimental and mathematical sciences. Today there is a greater awareness of the important role they play in the formation, dissemination, and circulation of knowledge. For instance, collections of fossils, minerals and rock samples played a key role in the emergence of new disciplines such as mineralogy and geology.

More specifically, reconstructing the history of parts of the collection assembled by Van Marum and the world that their individual elements belonged to helps us to answer the questions posed in the introduction to this book.

1. How did private palaeontology and mineralogy collections develop in the Netherlands during the seventeenth and eighteenth centuries, in terms of provenance, composition, and sales?

In the seventeenth century, rocks, minerals and fossils were generally incorporated into the collectors' cabinet (or *simpliciakast*) of a physician or pharmacist. In the eighteenth century, however, while such cabinets still existed, their main focus was on non-specific raw materials with medicinal associations. The religious context that had initially loomed so large in such collections also faded into the background. By the end of the eighteenth century, a collection was no longer primarily a reflection of God's creation, in which visitors could acquaint themselves with the divine message in a variety of ways. Direct references to the Bible had all but vanished by the beginning of the eighteenth century. The objects were slowly but surely pried loose from a traditional textual framework, a process that went hand in hand with the rise of a new conceptual framework and the emergence of new disciplines, most notably geology.

At the same time, the decorative element remained immensely popular throughout the eighteenth century, in the form of cut agates, carnelians, and opals, as well as marble, soapstone, and dendrite. The relationship between nature and art, and more in general the encyclopaedic ideal, endured longer in eighteenth-century collections than is generally assumed. The composition of the fossil sections was always

diverse, reflecting an accumulation of random acquisitions rather than any specific interest. It is possible that the unclear provenance of fossils meant that they were long viewed as curiosities and were therefore never subjected to a methodical classification. In this respect they differ from rocks and minerals, which were more numerous and easier to classify. It is noteworthy that the *Lapides* group generally occupied an increasing proportion of the collection as time went by. This is wholly consistent with the growing fascination of collectors with geology. They became less interested in handsome minerals and went in search of rocks that could help explain the history of the earth's crust. As for provenance, most collections had objects from the entire 'known world'.

The largest collections in the Dutch Republic soon attracted interest from elsewhere. As a result, large parts of them sometimes ended up in other countries (for instance in the collections built up in the seventeenth and early eighteenth centuries by Paludanus, Valckenier, and Seba). Conversely, many of the objects in them (in the collections of Vincent and Witsen, for example) were acquired from such foreign collections, through the collectors' international contacts. As a result of such transactions, major items in Scheuchzer's fossil collection, for instance, ended up in the Netherlands. Meanwhile, auctions of collections attracted a growing crowd of wealthy enthusiasts as the eighteenth century wore on. Such sales provided opportunities to expand their collections without the need for a network of contacts, and they possessed the necessary means. The collectors' items circulated within what was ultimately a fairly small world.

2. How were the geological collections in Teylers Museum built up? How were they classified and used, both as exhibits and as educational aids in Van Marum's lectures?

The main way in which Martinus van Marum sought to build up and expand his palaeontology and mineralogy collections for Teylers Museum was to undertake frequent journeys around Europe. On his travels he met with collectors, dealers, scholars, and mine supervisors from whom he purchased items directly for the museum. He maintained this network of contacts after returning home, noting in correspondence which items he was eager to acquire. Van Marum also journeyed to mines and mountain peaks, where he collected specimens himself. Auctions provided another source of acquisitions. Numerous private collections appeared on the market during his time at Teylers Museum and Van Marum took full advantage of the opportunities these sales afforded him.

In the early years, Van Marum divided the collection into four parts. The first of these sub-collections was classified systematically and stored in drawers, while a second one, similarly classified but with a more obvious visual appeal, was arranged in the central display case of the Oval Room from 1802 onwards. Then there was a collection of minerals that Van Marum referred to as 'geological' and to which he attached great importance, since 'the way in which they have been formed – which formation must have occurred in very different eras – teaches us about the different upheavals or disruptions of rock layers that have taken place on the surface of the earth. It also teaches us the great age of our planet, for which these specimens provide the clearest evidence.' In other words, these objects were at the heart of a growing debate in the scientific community. In this connection, Van Marum followed Abraham Gottlob Werner in referring to 'primary' and 'secondary' rocks – the former being made up of igneous and metamorphic rocks, and the latter of sedimentary rocks and fossils. This was one of the most educational collections, which Van Marum did indeed use in his geology lectures. The fourth collection was that of 'petrefacts', 'fossilised remains of

creatures that have inhabited the earth, and plants that have grown on it, in earlier centuries.' This collection was not classified systematically, but arranged geographically and placed in drawers. The largest items ended up in cabinets in the Oval Room. It is crucial to note that Van Marum kept the fossilised remains of animals and plants separate from the mineral and rock collection, which he saw as testimony to a remote past that could shed light on the history of the earth's crust.

Within a fairly short space of time, the minerals and rocks were classified in accordance with four different mineralogical systems. This reflects Van Marum's eager embrace of the new science of mineralogy and his close attention to its turbulent developments. He always tried to follow the latest trends. In 1783, a year before the Oval Room opened to the public, he started classifying the contents using Johann Gottschalk Wallerius's system. In 1790 he switched to the classification proposed by the Irish physicist Richard Kirwan (1733-1812), to be followed in 1799 by that of Abraham Gottlob Werner, based on the handbook by Johann Georg Lenz (1748-1832). Finally, in 1802, he adopted the system proposed by René Just abbé Haüy (1743-1822), while retaining Werner's as well. Werner's classification was primarily based on the outward appearance of rocks, while Haüy followed the modern science of crystal morphology, based on measurements of the angles between the faces of crystals. It is clear from the painstaking attention that Van Marum paid to these collections that they were of fundamental importance to the museum, from the point of scholarship as well as for their educational entertainment value. The fact that Van Marum adopted four different classification systems within just twenty years (1783-1802) demonstrates his fierce determination to keep the collections up-to-date and to ensure that they were classified, preserved, and displayed in accordance with the latest scholarly views.

3. What conclusions can we draw from the current material collections in Teylers Museum, which are – and this is truly unique – still present in situ? Identifying old labels can frequently enable us to reconstruct the provenance of objects from former private collections in the Netherlands and elsewhere.

Teylers Museum has preserved 6,000 largely handwritten eighteenth-century labels that were once attached to its rocks, minerals, and fossils. Although most became detached from these objects over the years, they have nonetheless been retained. Many of them once served as index cards. They give a description of the object along with its name, the place where it was found, and sometimes stratigraphic and bibliographical details and provenance. In other words, the labels constitute the collection's 'genealogy', as it were. By using handwriting analysis and comparing the labels to receipts, auction catalogues, travel journals, and correspondence, much of Teylers's mineralogy collection, in particular, can be reconstructed in terms of its provenance or previous owners, as appropriate. This procedure yielded the names of over seventy former owners, besides identifying the auctions at which Van Marum made purchases and the dealers with whom he corresponded. It also revealed that Teylers Museum is possibly the one institution that still possesses remnants of collections that have long since been dispersed. Teylers's label collection is probably the oldest, largest, and most diverse of its kind. The palaeontology and mineralogy collection reflects the dynamic way in which Van Marum made acquisitions, by travelling, trading, corresponding, buying at auctions, and arranging exchanges – at local, national, and international level.

4. How did the trade in fossils and minerals function? What suppliers were active in this market, and what was Van Marum's strategy in dealing with trading partners?

It is striking that trade (commerce) and science (knowledge) were in general not separate areas, but became more and more entwined. Dealers were often experts in their field and vice versa. This trend first set in around the beginning of the eighteenth century, when more and more quarries and mines were being opened up to serve the country's economic interests. Soil mapping produced images that added greatly to the stock of knowledge in the earth sciences, which was used for stratigraphic correlation, for instance. Rock and fossil collections were invaluable here [ok??] – some of which were built up by enthusiastic private collectors. In the latter half of the eighteenth century it became increasingly common to publish these new findings, sometimes merely describing a new mineral, but often describing a specific profile or part of an area, frequently accompanied by maps and detailed descriptions. Dealers exploited this trend by offering 'the geology' of a specific area to collectors in convenient pieces. Some of these dealers were private retailers, but more and more often they were people with official positions at mines or quarries, or mineralogy lecturers at a university or Mining Academy [ingekort ok??]. Interestingly, some of the dealers from Amsterdam, Rotterdam, and London who belonged to Van Marum's network of contacts were of German origin. This may indicate, perhaps, that they expected to find a larger clientele in European cities – especially ports – than in their mother country.

The public's growing fascination with the earth's history gradually shifted interest away from crystals in favour of rocks and fossils. France had long been the vibrant centre of trade in beautiful crystals – naturally thanks to the classification systems of Romé de L'Isle and then Haüy – whereas trade in rocks was concentrated in Germany, probably because of the country's Mining Academies. The market could scarcely keep up with the new trends, as was clear from Van Marum's complaints that he was compelled to cancel scheduled geology classes for lack of specific rocks.

His purchases show that he was always pursuing two aims: first, to present visitors with a collection in the Oval Room that was clearly arranged and classified in accordance with the latest views; and second, to have in stock the most comprehensive geological collection he could obtain for educational purposes. Mineralogical items were often purchased at auctions of the collections of private individuals, while rock samples and profiles were mainly obtained through trade.

5. From around 1780 onwards, ready-made collections for study purposes started to appear on the market, most notably in Germany. Van Marum purchased many of these collections. What was his underlying purpose in doing so?

Teachers at Mining Academies took advantage of the fine samples they had of geological profiles. At the end of the eighteenth century it became increasingly common for them to take over from dealers, who had only sold separate pieces. The teachers were able to compile convenient sets of samples displaying a mountain's successive rock layers, which they offered for sale to collectors. The stones would generally be numbered, the numbers corresponding to a handwritten or printed catalogue. The origins of these *Suitensammlungen* lay in Germany, where some mineralogists went so far as to set up a trading company to sell the rock formation sets. Some collections only contained the different types of rocks, while others came from a specific area and

visualised the entire succession of a geological profile. For Van Marum this was the best way of expanding the collection of Teylers Museum. More than any other collector in Holland he plumbed every corner of the market, buying variously from private dealers, mine employees, or university or Mining Academy teachers. Because of this eclectic approach, numerous collections of this kind, which greatly illuminated the geological development of specific regions, ended up in Teylers Museum not long after they were compiled.

6. How did the palaeontologist and mineralogist Van Marum use the collections as source materials in his education and research?

From 1796 to 1803, Van Marum gave a series of winter lectures to museum directors and their guests in which he presented his ideas about fossils and mountain formation, the earth's creation and the Great Flood. This lecture series gives an excellent picture of how Van Marum approached his work in the museum. First, in these lectures he could demonstrate precisely why all those purchases from individuals, at auctions, and on his travels had been so necessary. He always promised that the objects he discussed would be placed in the museum (if they were not already on display) along with explanatory captions. All this preliminary work could help to produce a catalogue with arguments that were built up more coherently. Since his audience consisted mainly of colleagues and patrons, it was easy enough to show what was lacking, and even to cancel certain topics if the material he needed was not available. He hoped in this way to encourage his patrons to enable him to purchase the missing items.

The objects were also intended to give curious visitors more insight into the origins of the earth and the way life on the planet had developed. Since those visitors were not in the audience, his lectures may be seen as a kind of laboratory in which he elaborated the ideas and theories that would eventually be presented in the museum. The collection thus became more and more educational in nature.

Van Marum always kept abreast of the latest theories of mountain formation, volcanism and the Great Flood, besides which he had a fine library at his disposal that he had founded himself. He followed the debates about volcanism and basalt formation, but took no active part in them. He did present visual references to the debate in the museum, however, by purchasing a basalt column and volcanic products as well as prints of the Giant's Causeway.

7. What place did Van Marum occupy within the ideological framework of physico-theology, in terms of efforts to promote the compatibility of religion and science? What developments took place in theology and science, and what was their mutual relationship?

In his lectures Van Marum always emphasised the religious aspect of the collections, so as to 'give every philosophical viewer an opportunity to broaden his views of the works of creation'. In contrast to his physics and chemistry lectures, which tended to highlight the practical usefulness of scientific research, those on geological topics had a more religious flavour. It is not inconceivable that Van Marum saw this is a tactical way of encouraging the directors to extend funds, and to continue to do so, since their interests and sympathies inclined more to physico-theology than the more utilitarian aspects of science. Basing himself on the writings of De Luc, Van Marum was able to outline the natural history of the earth and the world before the creation as related in the Old Testament. But he went a step further than that, by suggesting the

possible existence of successive waves of creation, each with a more perfect form of humanity. He translated his belief in these successive advances into a suggestion of entirely new 'communities' of reasoning beings, each one surpassing the one before. Not until the time described in the Book of Genesis did the current human beings emerge on the scene. This meant that it was impossible to recognise a fossilised human being as such, since no one knew what such a creature had looked like. Presented in this way, his views did not appear incompatible with the Bible. However, he confined such philosophical reflections to the restricted audience that attended his lectures, so that his ideas about the pre-Adamite man were only uttered behind closed doors. Indeed, it may well have been his controversial views on pre-Adamite man that prompted Director Van Zeebergh to stop him lecturing altogether in 1803.

In conclusion, how should we assess the protagonist of this tale? His greatest achievement was indisputably the creation of the collections themselves. It is surprising to note, in this connection, that Teylers Museum soon became a museum that was organised in a modern way, even according to today's standards, and that in most respects fulfilled the ICOM criteria for professional museums: 'A museum is a non-profit making, permanent institution in the service of society and its development, and open to the public, which acquires, conserves, researches, communicates, and exhibits, for purposes of study, education and enjoyment, material evidence of people and their environment.' It was Van Marum who gave substance to all these points.

While as a physicist and a chemist Van Marum was an original thinker, as an anatomist and a geologist he was more of a follower. When he did present original ideas, such as in the case of the elliptical tree trunks from the Carboniferous Period, it usually went wrong. His classification of the marine reptile known as the mosasaur was flawed even by the standards of his own times. It is not insignificant that the relationship between Cuvier and Van Marum was less than cordial and that Werner and Van Marum did not correspond at all. This was partly because in their respective fields, that of the large fossil mammals and the stratigraphy of the earth's crust, he did not possess their erudition. In that sense, the Van Marum period marks the transition to a new phase within science: that of the rise of specialist disciplines separated by strict dividing lines. Van Marum remained throughout his career an encyclopaedic know-it-all, a generalist, whose work as a collector, above all, was of incalculable value.

Recommendations for further research

No piece of research can be truly comprehensive. I should like to close by making a few recommendations and suggesting some guidelines for further research on the mineralogy and palaeontology collection of Teylers Museum.

1. I would recommend researching the labels on the micro-level: that is to say, by examining the relationship between the mineral, the place it was found, and the first owner, in order to get a better picture of the early history. I will add two examples.
2. The mineralogy collection of Naturalis Biodiversity Centre, formerly the National Museum of Natural History, does not have any of the old labels. Nonetheless, given what we now know about the early composition of this collection, it should be possible to identify pieces collected before the institution's establishment in 1820.

3. In the same way that Van Marum compiled the rock collections, both to display in the museum and to illustrate his lessons, part of the library was also intended to underpin his theories and to illustrate his ideas. Extant invoices allow us to reconstruct Van Marum's purchasing policy. In addition, research on the provenance of the library's contents, using invoices, bookplates, and old notes on flyleaves and frontispieces could reveal a good deal about former owners. Just as many rocks in Teylers Museum are remnants of collections that have been lost, many books, too, could be traced to interesting scholars' libraries. This is unexplored territory. Such research could also help to make it clearer how Van Marum developed his lectures with the aid of objects and written sources.

Examples for further research on labels

Let us take the following example: it consists of just three small scraps of paper, but since these scraps are inscribed 'de Goethe' they immediately attract attention.[1] Van Marum's handwriting is easily recognisable. He may well have copied the labels from Goethe: twice we find 'spätiger Eisenstein aus Graubünden' ('stratified iron-stone [siderite] from Graubünden') and once the Dutch-German hybrid description 'Pikerts met Braunspath van Johan Georgenstadt' ('pitchblende with ankerite from Johan Georgenstadt'). On 17 July 1798 Van Marum had his first meeting in Weimar with 'Privy Councillor Von Goethe'. He was received with 'uncommon courtesy'.[2] After Van Marum had looked at the collection, Goethe offered him a number of specimens that were not represented in Leiden. Since Goethe scarcely owned any fossils, Van Marum promised to send him some material from the St Pietersberg hill in exchange.[3] Goethe probably invited Van Marum to choose some mineral rocks for the museum and take them with him straight away, given that there are no records of any consignment being received from Weimar. Conversely, however, a small box of fossils did arrive at Goethe's house on 11 December 1798, for which the writer sent Van Marum his warmest thanks the next day. As Van Marum wrote in his travel journal, Goethe himself had been an active collector. Had he collected the specimens he donated to Teylers Museum? In 1785, on his way to Karlsbad, Goethe stopped off in Johann Georgenstadt, where the mine supervisors offered him some minerals,[4] including pieces of *Pechblende* (pitchblende). Four years later, the German chemist Martin Heinrich Klaproth (1743-1817) examined from the same mine some pieces of ore that he called uran[in]ite, and from which uranium was thenceforth extracted. Although the label provides very little information, we can be almost certain that the piece of pitchblende was presented to Goethe as a gift in 1785. A few years later, in 1788, Goethe journeyed to Graubünden in Switzerland, where he picked up some siderite, a piece of which is now in Teylers Museum.[5]

A different label, also in Van Marum's handwriting, bears the inscription 'Sable de verd du perou' ('Green sand from Peru'), evidently collected by the French botanist Joseph Dombey (1742-1794).[6] Dombey accompanied a French expedition to South America, where he discovered a remarkable green

1 Labels L 650, 667, 2037.

2 J.A.M. Rijk, 'Drei bisher unveröffentlichte Briefe an Goethe' in *Neophilologus* 16, 1930, pp. 261-267.

3 This donation can be found in Hans Prescher, *Goethes Sammlungen zur Mineralogie, Geologie und Paläontologie: Katalog*, Berlin 1978, p. 639 under the heading for Maastricht, 10 items.

4 www.bergbauverein-ronneburg.de (consulted May 2016).

5 Erwin Poeschel, 'Goethes Reise durch Graubünden', in *Bündnerisches Monatsblatt. Zeitschrift für bündnerische Geschichte, Landes- und Volkskunde*, 1951, vol. 4, pp. 97-107.

6 L 2474.

mineral in 1769 in the Atacama, the desert that divides Peru from Chile. This mineral was later presented to the Académie des Sciences, and in 1801 it was given the name 'atacamite' by Prince Dmitri Alexeyevich Gallitzin (1728–1803). The Museum National d'Histoire Naturelle in Paris still has the flask (no. 5.98, 'cuivre muriaté du Pérou' [muriate of copper]) in which Dombey presented the rock to the King's Office. This mineral was later imported in large quantities from the mines of Atacama, since it proved ideal for drying the ink of quill-written manuscripts.[7] So how did these small crystals end up in Teylers Museum? The final line on the label reads 'Abbé Rochon d.d.'. The abbreviation d.d. stands for 'dono dedit' (gave this offering), so the inscription tells us that Alexis-Marie de Rochon donated the crystals to the museum. De Rochon (1741-1817) was an astronomer with a passion for mineralogy. His many travels included a journey to South Africa, where he discovered the mineral prehnite, later described by the German mineralogist Abraham Gottlob Werner, and took a sample of it back to Europe. De Rochon and Van Marum met in London in 1790, and it is there that the crystals must have changed hands. Van Marum's travel journal contains only a single sentence referring to the meeting, but more can be found in the financial records: 'to Abbot Rochon for four prisms of quartz crystal to demonstrate double refraction, received from the Reverend Father on 4-4.'[8] One of the four prisms used to demonstrate double refraction is still present in the central display-case of the Oval Room.

7 Anne-Marie Brenot, 'Les voyageurs français au Pérou au XVIIIe siècle', in P.A. Colin (ed.), *Des européens dans l'Amérique coloniale et aux Caraïbes, XVIe-XIXe, in Revue d'histoire moderne et contemporaine*, vol. 35 (2), 1988, pp. 240-261; Catherine Lang, 'Joseph Dombey, un botaniste au Pérou et au Chili: Présentation des sources', in P.A. Colin, 'Des européens dans l'Amérique coloniale et aux Caraïbes, XVIe-XIXe', in *Revue d'histoire moderne et contemporaine*, vol. 35 (2), 1988, pp. 262-274.

8 ATS 622, 'Nota van Uitgaaf te London voor Teylers Museum in Julij & Augustus 1790' ('Expenditure in London for Teylers Museum, July and August 1790').