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Science for the public:  
the translation of popular texts on experimental  
philosophy into the Dutch language  
in mid-eighteenth century

In 1736 a Dutch translation was published of *A Course of Experimental Philosophy* (1735), a textbook on Newtonian physics written by the English mathematician John Theophilus Desaguliers. This solid quarto volume had been translated by an unnamed Dutch translator, who complained in his preface that as most of the featured topics had never before been discussed in the Dutch language, many artificial words had had to be invented.<sup>1</sup> Seen from the perspective of the common Dutch reader, ‘experimental philosophy’ – or perhaps better ‘Newtonian physics’ – was indeed a rather new subject at the time. It was, however, a booming topic. In the 1730s, Newtonian physics was becoming highly fashionable in the Netherlands, even to the extent that it inspired the Dutch scholar Petrus van Musschenbroek to produce his own textbook on physics in Dutch, the *Beginsels der Natuurkunde* (1736; 2<sup>nd</sup> ed. 1739), aimed especially at his ‘fellow compatriots’.<sup>2</sup> A fine illustration of this popular movement in the Netherlands was provided in 1737 by Jan Wagenaar, the Dutch translator of another English book on Newtonian physics. In his preface, he wrote:

[These days] everywhere societies are founded, in which one deliberates about physics and performs experiments. Various extraordinary persons take great pains in collecting many and costly apparatuses; they entertain their friends less at appetizing spices and liquor, than at a series of physical observations. There is a kind of envy among the common people. Every one seeks to become a connoisseur of natural philosophy. The merchant leaves his desk to work with the air pump, and he does not hesitate to work up into a sweat on the composition of some apparatus. The artisan rests from his work to set himself to these things in

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1. ‘Want schoon de schryver zyne gedagten wel op een klare wys teneêr stelle, waren de meeste zaken evenwel in onze taal nooit verhandeld, en bygevolg de Kunst-woorden nieuw.’ ‘Berigt van den Vertaler’, in *De Natuurkunde uit Ondervindingen Opgemaakt* [...] *Uit het Engels vertaald door een Liefhebber van de Natuurkunde*, ed. John Theophilus Desaguliers (Amsterdam, Isaac Tirion, 1736), unnumbered page 2. In 1746 and 1751, two other volumes were published.
  2. From the title page: ‘Beschreeven ten dienste der landgenooten’.

which he takes far more pleasure. Yes, if one would believe it, even farmers who one would usually regard as examples of stupidity, are practising mathematics and are becoming natural philosophers.<sup>3</sup>

The sudden outburst of interest in natural philosophy in general, and more specifically in experiments and scientific instruments, generated a strong demand for popular literature on these topics. Dutch publishers tried to fill this gap in the market, printing various Dutch translations of books and articles of foreign origin. In the following decades Dutch translations of works by English scholars such as Baker, Cotes, Derham, Desaguliers, Hauksbee, Keill, Martin, Newton, Ray, Smith, and others were produced. But Holland, being one of the main centres of European book trade, offered Dutch translations of scientific texts of German and French origin also, including editions of works by Wolff and Winkler, or Colonne, Nollet and Regnault.

In this paper, I will outline the reasons for the emergence of the popular interest in physics. Further, I will outline the role played by Dutch translations of foreign literature in this popularisation. A particular focus of this investigation is on the translation of books on experimental physics: Which books were translated, by whom, and in what way? What do we know about the networks in which the translators operated? How was the process of translating handled? With what kinds of problems were translators confronted? What was their contribution to the noble phenomena of the circulation and transmission of knowledge, a process that touches the essence of Western civilisation? As recent historical research has shown, the processes of formation, spread and use of natural knowledge cannot be regarded as the products of an autonomous universal process but instead as the result of cultural influences, varying in time and place. The microhistory at hand intends to highlight some of the parameters of this process.

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3. 'Men rigt overal gezelschappen op, daar men de Natuurkunde verhandelt, en proeven doet. Verscheide byzondere Persoonen maaken hun werk van het verzamelen van veel en kostbaare Werktuigen, en onthaalen hunne Vrienden minder op smaakelyke spyze en drank, dan op eene reeks van natuurkundige Waarneemingen. Daar heerscht een soort van een' naayver onder 't Gemeen. Elk zoekt een Natuurkenner te worden. De Koopman trekt zyne hand van de Schryftafel, om die aan de Lugtpomp te slaan, en ontziet zig niet daar aan, en zelfs aan het samenstellen van Werktuigen, tot zweetens toe te arbeiden. De Handwerksman verpoost zig van zyn werk, door een ander, daar hy meer vermaak in scheidt. Ja, zou men 't gelooven, Landluiden zelve, die men als voorbeelden van domheid plagt aan te zien, oefenen zig in de Wiskunde, en worden Natuurkenners.' [Jan Wagenaar], 'Voorreden van den Overzetter' ('Introduction by the translator'), in *Filozofische Onderwyzer of Algemeene Schets der Hedendaagsche Ondervindelyke Natuurkunde*, ed. Benjamin Martin (Amsterdam, I. Tiron, 1737; 2<sup>nd</sup> ed. 1744; 3<sup>rd</sup> ed. F. Houduyn, 1765). Unless otherwise noted, all translations are by the author.

## I. The Rise of Newtonianism in the Dutch Republic

Natural philosophy played an increasingly prominent role in bourgeois culture in eighteenth century Europe. The apparent success of experimental methods in the seventeenth century resulted in the widespread popularisation of ‘natural philosophy’ or experimental physics in the eighteenth century, with effects in all branches of elite and bourgeois Enlightenment society. Various aspects of this cultural phenomenon have already been highlighted.<sup>4</sup> An important insight of these studies is the finding that the construction of scientific facts and involvement of researchers in scientific activities is to a large extent a result of a complex social process, involving multiple interactions on personal, instrumental, and socio-cultural levels. Broadly speaking, the Netherlands followed this European trend, although with specific accentuations.<sup>5</sup>

The movement towards the popularisation of Newtonian philosophy in the Netherlands began within Dutch academic circles around 1715. The starting point had been the publication in 1713 of a second edition of Newton’s *Principia* (1687), of which a pirated edition had been produced in Amsterdam in 1714. This edition had been favourably discussed by two scholarly French-language journals published in the Netherlands (the *Bibliothèque Ancienne et Moderne* and the *Journal littéraire* [!]). The reviewer of the latter was probably the young lawyer Willem Jacob ’s-Gravesande, one of the editors, who would personally make Newton’s acquaintance in 1715 during a Dutch embassy voyage to London. The same year, the influential Leiden professor of medicine, Herman Boerhaave, delivered a lecture in which he recommended Newton’s empirical-mathematical approach as the most appropriate for the study of nature. However, the introduction of Newton’s ideas

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4. Cf. for instance Jan Golinsky, *Science as public culture: chemistry and the Enlightenment in Britain, 1760-1820* (Cambridge 1992); Simon Schaffer, ‘Natural philosophy and public spectacle in the 18<sup>th</sup> century’, *History of science* 21 (1983), p. 1-43; Steven Shapin, ‘A Scholar and a gentleman: the problematic identity of the scientific practitioner in early modern England’, *History of science* 29 (1991), p. 279-327; Larry Stewart, *The Rise of public science: rhetoric, technology, and natural philosophy in Newtonian Britain, 1660-1750* (Cambridge 1992); Geoffrey V. Sutton, *Science for a polite society: gender, culture & the demonstration of Enlightenment* (Colorado 1995); and Alice N. Walters, ‘Conversation pieces: science and politeness in eighteenth-century England’, *History of science* 35 (1997), p. 121-154.
  5. Cf. Lissa Roberts, ‘Going Dutch: situating science in the Dutch Enlightenment’, in *The Sciences in Enlightened Europe*, ed. William Clark, Jan Golinsky, and Simon Schaffer (Chicago, London 1999), p. 350-388; and Henricus A. M. Snelders, ‘Professors, amateurs and learned societies: the organisation of the natural sciences’, in *The Dutch Republic in the 18<sup>th</sup> century: decline, Enlightenment and revolution*, ed. Margareth Jacob and Wijnand W. Mijnhardt (Ithaca 1992), p. 308-323.

into the Leiden University curriculum had to wait until 's-Gravesande's appointment as professor at the institution in 1717. In this position, 's-Gravesande would become one of the most influential Newtonians in Europe.

The demonstration-lecture, in which a practitioner lectured on the physical world and elucidated his words through a variety of physical demonstrations, had emerged in Europe in the early eighteenth century. The first lectures of this kind were most likely given by Pierre Polinière in the French salons of the Louis XIV period. 's-Gravesande had probably attended such a lecture during his trip to London, at that time most likely performed by the Newtonian Desaguliers, who had commenced such lessons around 1713. In any case, 's-Gravesande put this method of instruction at the heart of his pedagogy. His Latin textbook on Newtonian physics, published during the years 1719-1721, offered the first full illustrated transcription of this new style of philosophical teaching. The book, entitled *Physices Elementa Mathematica, Experimentis Confirmata. Sive Introductio Ad Philosophiam Newtonianam* ('Mathematical Principles of Physics, Proved by Experiments, with an Introduction on Newtonian Philosophy'), became very influential. The didactic strategy that 's-Gravesande used in this book for the instruction of Newtonian physics was foremost based on experiments and demonstrations with a wide variety of apparatus. 's-Gravesande had developed these scientific instruments in collaboration with the Leiden instrument maker Jan van Musschenbroek. Their designs became so popular that they were manufactured in abundance for the many cabinets of experimental philosophy that emerged throughout Europe during the eighteenth century.<sup>6</sup> Nevertheless, this convincing and sometimes amusingly playful rhetoric was not the main reason for the growing trend in the Netherlands towards the popularisation of experimental philosophy.

## II. Physico-theology, dissenters and the popularisation of Newtonianism in the Dutch Republic

For many in the Calvinist Netherlands, it was of foremost importance that Newton and his epigons had restored the possibility of a divine providence in their philosophical principles. Providence had been absent in the rational systems of natural philosophy constructed by seventeenth-century philosophers, including René Descartes and Baruch de Spinoza. In reaction to these 'Radical Enlightenment' ideas, a more moderate form of Enlightenment emerged,

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6. Cf. Peter de Clercq, *At the sign of the oriental lamp: the Musschenbroek workshop in Leiden, 1660-1750* (Rotterdam 1997).

in which theology reclaimed priority. According to Newton and his followers, the order and regularity of the universe existed only due to the grace of God; it was solely due to his responsibility towards his creatures that the laws of nature were formed in God's universe. Thus, in addition to studying the Bible, the study of nature was a legitimate way to learn about God's meaning and purposes for the world. Accordingly, investigating nature with an air pump, telescope, microscope, or barometer equated exactly with glorifying the Creator.

This kind of reasoning was advocated by the Dutch burgomaster of Purmerend, the physician Bernard Nieuwentyt, an early adept of Newton. His elaborate book *Het Regt Gebruik der Werelt Beschouwingen, ter Overtuiging van Ongodisten en Ongelovigen Aangeoont*, ('The Right Use of World Views, Demonstrated for the Sake of Convincing Atheists'), published in Amsterdam, in 1715, would become one of the bestselling titles of the eighteenth-century Dutch Republic, reaching its seventh edition in 1759. Nieuwentyt introduced a genre of writing in the Netherlands that is termed by Jan Bots as 'physico-theological'.<sup>7</sup> This expression derives from the English book *Physico-theology* by William Derham that was published in London in 1713 and was translated into Dutch in 1728. Both Nieuwentyt and Derham preached the same method of pious glorification of God through the study of nature, in accordance with the principles formulated by Newton.

This divine inspiration was the main reason that the earliest interest in Newton's physics emerging outside scholarly circles was observable in the Dutch Mennonite community. The members of this pious – but dissenting – religious group were excluded from Netherlands governmental offices, but through fortuitous trade and manufacture many of them had become very wealthy. Mennonites led a humble lifestyle by tradition, with a highly personal spiritual perception of their belief. The physico-theological aspect of Newtonianism legitimised the study of nature for this group, who had always been convinced of a divine scheme for mankind. So for Mennonites, the idea that nature is regulated by laws was easily acceptable, as was the notion that nature could be manipulated for the benefit of mankind. It is a small wonder that one of the earliest water-pump factories in the Netherlands was owned by a Mennonite. This was Daniel van Mollem, the same merchant to whom the aforementioned Van Musschenbroek had dedicated his textbook on Newtonian physics. Neither was it a coincidence that, as demonstrated in Bots's pioneering study of Dutch physico-theological literature, a number of translators of texts on natural philosophy were related to the Dutch Mennonite or Remonstrant community. The study of nature offered these dissenters not

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7. Cf. Jan Bots, *Tussen Descartes en Darwin: geloof en natuurwetenschap in de achttiende eeuw in Nederland* (Assen 1972), preface.

only the possibility of spiritual contemplation but also the possibility of economic innovation and social emancipation.<sup>8</sup>

One of the earliest Dutch translations of a Newtonian physico-theological text was a booklet produced in 1716 by the Mennonite scholar Lambert ten Kate Hermanszoon (1674-1731).<sup>9</sup> This was entitled *Den schepper en zyn bestier te kennen in zyne schepselen; volgens het licht der reden en wiskonst* ('The Creator and his governance known through the study of his creatures, following the light of reason and mathematics'). It was a translation of George Cheyne's *Philosophical principles of natural religion*, of which a first edition had been published in London in 1705. Ten Kate wrote a large introduction to the book, in which he praised Newton for having invented a satisfactory method of reasoning in natural philosophy; in Newton's approach, the hand of God clearly could be recognized.<sup>10</sup> The translation itself was presented in a free style, and was based partly on an earlier extract that had been published by Pieter le Clercq in the *Bibliothèque Ancienne et Moderne*, with adaptations and additions made by Ten Kate.<sup>11</sup>

Within the Mennonite community, Lambert ten Kate Hermanszoon was a most interesting and influential figure. A man of many skills, he has been described as 'a curious aesthetician, who apart from being an expert on art and a collector, was a grain merchant by trade and a linguist, theologian, physicist and mathematician by vocation'.<sup>12</sup> He was one of the earliest acquaintances of the Danzig-born instrument maker Daniel Gabriel Fahrenheit, who had settled in Amsterdam in 1717. That same year, Ten Kate published an article on Fahrenheit's meteorological instruments, and the representation of

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8. Cf. Ernst Hamm, 'Mennonites, science and progress in the Dutch Enlightenment', in *The Global and the local: the history of science and cultural integration of Europe: [electronic] proceedings of the 2<sup>nd</sup> international conference of the European Society for the History of Science (Cracow, Poland, September 6-9, 2006)*, ed. Michal Kokowski (Cracow 2007), p. 650-657; online edition: <<http://www.2iceshs.cyfronet.pl/proceedings.html>>.

9. Cf. Rienk Vermij, 'The Formation of the Newtonian philosophy', *British journal for the history of science* 36 (2003), p. 183-200. For Ten Kate, see C. L. van Cate, *Lambert ten Kate Hermanszoon (1674-1731), taalgeleerde en kunstminnaar* (Utrecht 1987). For his scientific researches see also my 'Reflecting "popular culture": the introduction, diffusion and construction of the reflecting telescope in the Netherlands', *Annals of science* 61 (2004), p. 407-452 (esp. p. 420-421).

10. Cf. Lambert ten Kate, *Den schepper en zyn bestier te kennen in zyne schepselen; volgens het licht der reden en wiskonst. Tot opbouw van eerbiedigen godsdienst, en vernietiging van alle grondslag van Atheisterij, alsmede tot een regtzinnig gebruik van de Philosophie* (Amsterdam, Pieter Visser, 1716), p. xv-xvi ('voorreden').

11. Cf. *ibid.*, p. xvii, referring to the *Bibliothèque Ancienne et Moderne*, vol. III, part 1.

12. 'Deze merkwaardige aestheticus, die behalve kunstkenner en verzamelaar, van beroep graanhandelaar en van roeping taalgeleerde was [...].' Jan G. van Gelder, 'Lambert ten Kate als kunstverzamelaar', *Nederlands kunsthistorisch jaarboek* 21 (1970), p. 139-186.

these in Ten Kate's own cabinet of scientific instruments testifies to their close mutual relationship. So it could well have been Ten Kate who stimulated Fahrenheit to start a series of regular lessons on natural philosophy in 1718 for a group of 'Mennonite enthusiasts'.<sup>13</sup> Experimental demonstrations were at the heart of these gatherings.<sup>14</sup> A surviving manuscript with lecture notes by one of Fahrenheit's students gives evidence of these lessons.<sup>15</sup> From 1721 onward, Fahrenheit used 's-Gravesande's Latin textbook in his physics lessons. These lessons were continued well into the eighteenth century. In 1761, the Mennonite Seminary, in which most Dutch Mennonite preachers were educated, even installed its own cabinet of instruments for experimental philosophy.<sup>16</sup>

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13. That is: 'mennoniste liefhebbers'. Cf. Pieter van der Star, *Fahrenheit's letters to Leibniz and Boerhaave* (Amsterdam 1983), p. 104, n. 11.
  14. Cf. Ernst Cohen and Wilhelma A. T. Cohen-De Meester, 'Daniël Gabriel Fahrenheit', *Verhandelingen der Kon. Akad. van Wetenschappen, Afd. Natuurkunde (Eerste sectie)* 16.2 (1936); and Van der Star, *Fahrenheit's letters*, p. 80. Two papers by Fahrenheit were published in the physico-theological journal edited by his assistant Willem van Ranouw, *Kabinet der Natuurlyke Historien, Wetenschappen, Konsten en Handwerken*, 9 vols (Amsterdam 1719-1724). This compilation of assorted outlandish literature was published by several Mennonite publishers: Hendrik Strik, 1719-1721; Zacharias Moele and Johannes de Ruiter, 1722; Balthasar Lakeman, 1722-1723. A last part with contributions by Lambert ten Kate on 'Plantgewassen en Muggen' was published in 1727. The series was reprinted twice, in 1732 and in 1758-1759.
  15. Jacob Ploos van Amstel Cornelisz, *Natuurkundige lessen van Daniel Gabriel Fahrenheit over de Gezicht Doorzicht en Spiegelkunde, alsmede over de Waterweg en Scheijkunde, in onderscheidene bijeenkomsten door hem afgehandeld* (Amsterdam 1718), Univ. Library Leiden, BPL 772. In 1800, this manuscript was bought by Jean Henri van Swinden at the auction sale of the painter Cornelis Ploos van Amstel, the grandson of the author. These lecture notes reveal, on page 114, that Fahrenheit also used the book of Joachim d'Alencé, *Traité des Baromètres, thermomètres et notiomètres ou hygromètres* (Amsterdam, Henri Wetstein, 1688; 2<sup>nd</sup> ed. Paul Marret, 1707). A Dutch translation of this book was published in 1730 at The Hague by Jacobus de Jongh (re-issued 1738 by Gerard Block) but at least two earlier translations in manuscript have been preserved, one of them made by the Mennonite merchant Gerrit Schoenmaker, so it is probable that these handwritten translations originated from the circle of Mennonites around Fahrenheit. Cf. Gerrit Schoenmaker, *Verhandeling van de barometer* (c. 1730), Amsterdam University Library, classmark XI G 22; cf. *De Navorscher* 1 (1851), p. 315 and *De Navorscher* 2 (1852), p. 149. For the other manuscript from the book collection of the author, see the exhibition catalogue *Uit de lucht gegrepen: Geschiedenis van de weerkunde in Nederland* (Leiden, Museum Boerhaave, 2003), p. 15.
  16. Cf. Huib J. Zuidervaart, 'Meest alle van best mahoniehout vervaardigd: het kabinet van filosofische instrumenten van de doopsgezinde kweekschool te Amsterdam, 1761-1828', *Gewina: Tijdschrift voor de Geschiedenis der Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek* 29 (2006), p. 81-112; reprinted in *Doopsgezinde bijdragen: nieuwe reeks* 34 (2008), p. 63-104.

### III. The Impact of Desaguliers's tour of the Netherlands

Where the physico-theological component of Newtonianism had made experimental physics respectable in parlours, the real boost in its popularity in the Netherlands was caused by a series of lectures given in the early 1730s in a number of Dutch cities by the English Newtonian John Theophilus Desaguliers. Why Desaguliers decided around 1730 to lecture in the Netherlands is not known. One of Desaguliers's relatives lived in Amsterdam, so contacts with Holland were close.<sup>17</sup> About a decade before his Dutch tour, Desaguliers had made efforts to introduce Dutch books to the English market. In 1718, he had written a laudatory preface to an English edition of the Dutch physico-theological book of Nieuwentyt, and three years later he himself had prepared an English translation of 's-Gravesande's textbook.<sup>18</sup> The two Newtonians knew each other personally, for Desaguliers had met 's-Gravesande during his visit to London in 1715. The demonstration models of the kind described by 's-Gravesande fitted perfectly into Desaguliers's own procedures. Such apparatus offered him an efficient rhetorical framework to convince his public of the validity of Newtonian physics.

Desaguliers's well-organised tour of the Netherlands was supported with a considerable publicity effort; it seemed that for Desaguliers, commercial motives were as important as the Newtonian message. A prospectus of Desaguliers's Rotterdam lessons shows that he performed his lectures in three languages every day: 'in the morning from seven-thirty until nine o'clock in French, from ten o'clock in English, and in the afternoon at four in Latin'.<sup>19</sup>

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17. Desaguliers could also have been invited to the Netherlands as a freemason. In 1731, he initiated, at The Hague, the first Masonic lodge in the Netherlands.

18. Bernard Nieuwentyt, *The Religious Philosopher, translated from the Dutch by John Chamberlayne, with a prefatory letter by John Theophilus Desaguliers* (London 1718-1719); Willem Jacob 's-Gravesande, *The Mathematical Elements of Natural Philosophy, confirmed by Experiments, or an Introduction to Sir Isaac Newton's Philosophy, translated from the Latin by John Theophilus Desaguliers* (London 1721).

19. '[...] de lessen in deze voege werden geschikt, dat zy des morgens van half agt tot negen ure in de Fransche taal, des morgens te tien uren in de Engelsche taal, en des namiddags te vier uren in het Latyn gegeven werden, alles voor heeren, dames en andere liefhebbers, alle werkdagen, behalve des saterdags.' Quotation from Johan A. van Reijn, 'John Theophilus Desaguliers', *Thoth, tijdschrift voor vrijmetselaren* 34.5 (1983), p. 165-203 (p. 193) after a printed announcement ('Bekentmakinge'), which was coated into a manuscript with notes of Desaguliers's course which until 1940 was present in the then demolished library of the 'Bataafsch Genootschap der Proefondervindelijke Wijsbegeerte' at Rotterdam. For further details cf. Huib J. Zuidervaart, *Van 'Konstgenoten' en Hemelse Fenomenen: Nederlandse Sterrenkunde in de Achttiende Eeuw* (Rotterdam 1999), p. 69-82. See also: Marius J. van Lieburg, 'De Geneeskunde en natuurwetenschappen binnen de Rotterdamse geleerde ge-

Desaguliers amazed his rich lay-audience of more than a thousand listeners – both men and women – with spectacular demonstrations. The ‘show’ element of Desaguliers’s lectures was to be a feature that persisted. With him the so-called *Physique Amusante* made its debut in the Dutch public sphere.

It is therefore not surprising that the first Dutch textbook on Newtonian physics was a short outline of Desaguliers’s lessons, produced by one of his Dutch listeners, written probably in Rotterdam or The Hague. The small, illustrated booklet contains references to some Latin terminology used by Desaguliers, so the author must have attended an afternoon session, and have been capable of understanding Latin. In 1731, the booklet was published in Amsterdam by the young Mennonite publisher Isaac Tirion (1705-1765) and was entitled *Korte inhoud der filosofische lessen, vervattende een kort begrip van de beginselen en gronden der proef-ondervindelijke natuurkunde* (‘Short outline of the philosophical lessons, containing a short understanding of the principles and foundations of experimental physics’). Whether the edition was inspired by the outline of Desaguliers’s lessons given in England in 1717 is unknown.<sup>20</sup> It presented the lectures and the use of several scientific instruments in an amiable and concise way. In 1732, two reprints were already required, to which a separate part, containing a description of Desaguliers’s newly designed demonstration planetarium, was added.<sup>21</sup>

Desaguliers’s zeal and enthusiasm inspired many others. In the preface of his *Beginsels der Natuurkunde*, the Dutch Newtonian Van Musschenbroek stated that the apparent success of Desaguliers’s tour had stimulated him to write a textbook on experimental physics. Appearing in 1736, it was the first of its kind in the Dutch language.<sup>22</sup> Driven by the effect of Desaguliers’s tour,

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nootschappen uit de 18e eeuw’, *Gewina: Tijdschrift voor de Geschiedenis der Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek* 1 (1978), p. 14-22 and p. 124-143.

20. Cf. John Theophilus Desaguliers, *Physico-Mechanical Lectures or an account of what is explained and demonstrated in the course of mechanical and experimental philosophy* (London 1717).
21. *Beschryving van het planetarium, dienende tot een vervolg op den Korten Inhoud der Philosophische Lessen van Dr. J. Th. Desaguliers* (Amsterdam, Isaak Tirion, 1732). As the preface of this tract states that the author did not live to see his work in print, this author could have been Lambert ten Kate who died in December 1731. Perhaps Ten Kate was also ‘the distinguished naturalist’ who, in 1731, had offered the composer of Desaguliers’s *Korten Inhoud der Philosophische Lessen* to check these lecture notes.
22. In 1700, a Dutch book with similar title, *Beginselen der Natuurkunde*, had been published in Amsterdam as a Dutch translation – by the Amsterdam merchant Ameldonck Block – of a textbook on natural philosophy made by Nicolaas Hartsoeker. This book was originally published in French as *Principes de Physique* (Paris 1696). It was completely based on Hartsoeker’s interpretation of speculative Cartesian physics. Hartsoeker was well known, not only as a natural philosopher but also as an instrument maker of several optical devices. He was strongly opposed to Newton’s ideas, as is clear from his last book, *Recueil de plusieurs*

two Mennonite publishers launched their own quarterly journal in order to create a forum in the Dutch language for all kinds of news in the field of the natural sciences.

With the *Uitgeleeze Natuurkundige Verhandelingen* ('Selected physical treatises') the Amsterdam publisher Tirion aimed at two goals. Firstly, he wanted to offer his Dutch readers an opportunity to study valuable texts on natural philosophy, taken from foreign journals, in their own language. Secondly, Tirion invited Dutch scholars to submit original contributions. It seemed that it was Tirion's ambition to create a Dutch equivalent of the *Philosophical Transactions*, the scientific journal edited by the Royal Society of London. Tirion sought to found a platform for the exchange of scientific novelties in the Dutch Republic.<sup>23</sup> According to Tirion, Desaguliers personally supported this initiative. After an enthusiastic start in 1731, the project stagnated almost immediately. The two editors Tirion had assigned – one of them probably Lambert ten Kate – both died unexpectedly.<sup>24</sup> But thanks to the assistance of Jan Wagenaar, a young translator who had attended Desaguliers's Amsterdam lessons, the first volume was completed in 1733.<sup>25</sup> It contained translated articles from the *Philosophical Transactions* and the *Mémoires* of the French Académie Royale des Sciences but also presented some original contributions by Dutch experimental philosophers, among them Van Musschenbroek, Boerhaave, and Lulofs. It seemed a promising beginning, yet Tirion's initiative, too, lost momentum. As time went by, only three volumes of the *Uitgeleeze Natuurkundige Verhandelingen* were published and in 1741 the journal ceased to exist.<sup>26</sup>

In the meantime, other publishers had entered the market. Between 1732 and 1735, the joint publishers Adriaan Wor and the heirs 'Onder de Linden'

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*pièces de physique, où l'on fait principalement voir l'invalidité du système de Mr. Newton* (Utrecht, Broedelet, 1722).

23. Cf. Piet Visser, 'Isaak Tirion (1705-1765), Amsterdams uitgever en promotor van de Nederlandse Verlichting – een verkenning', in *Boek & Letter: boekwetenschappelijke bijdragen ter gelegenheid van het afscheid van Prof. Dr. Frans A. Janssen*, ed. Jos Biemans, Lisa Kuitert, and Piet Verkrujssse (Amsterdam 2004), p. 467-493.
24. In 1732, Tirion published some poems in commemoration of Ten Kate's death and auctioned Ten Kate's library and cabinet of curiosities and scientific instruments. See Zuidervaart, 'Reflecting "popular culture"', p. 420.
25. In due time, Jan Wagenaar would become Holland's most famous historian but in his youth, he made a living by translating various books and articles, mostly for Isaak Tirion. Strictly speaking, Wagenaar was not a Mennonite but many of his friends were. Cf. Pieter Huizinga Bakker, *Het leven van Jan Wagenaar* (Amsterdam 1776), p. 13-16; Leonard Hendrik Maria Wessels, *Bron, waarheid en de verandering der tijden: Jan Wagenaar (1709-1773), een historiografische studie* (The Hague 1997).
26. Cf. Wiep van Bunge *et al.*, *Dictionary of seventeenth and eighteenth-century Dutch philosophers* (Bristol 2003), col. 1002-1003 and col. 1062-1064.

published five octavo volumes with texts on natural philosophy, almost all selected from the *Philosophical Transactions*.<sup>27</sup> These texts were translated by the hodman Pieter le Clercq, a well-known and diligent translator of a range of types of foreign literature.<sup>28</sup> The initiative of the Mennonite bookseller Marten Schagen had even greater impact. Schagen had, in 1732, founded a periodical in which he aimed to present a broad spectrum of translated scholarly work in various fields, mostly written by foreign authors. This quarterly, entitled the *Godgeleerde, historische, philosophische, natuur-, genes- en aerdryks-kundige, poëtische en regtsgeleerde vermakelykheden* ('Theological, historical, philosophical, physical, medical, geographical, poetical and juridical entertainments'), was almost single-handedly edited by Schagen who also personally translated most of the articles.<sup>29</sup> In 1738, when Schagen was appointed as a full-time Mennonite preacher at Alkmaar, the periodical was passed to other publishers, who continued this journal of miscellany – with unknown editors – until 1747.

To meet the still increasing demand for appropriate literature, several Dutch translations of books on physico-theology, natural philosophy or experimental physics were released in the 1730s. In the field of physico-theology, this began in 1728 with a translation by the Mennonite physician Abraham van Loon of Derham's *God-leerende Natuurkunde* ('Theologising physics'), its continuation – Derham's *Godgeleerde Sterrekunde* ('Theological astronomy'), probably translated by the Mennonite Jan Siewertsz Centen – appearing in 1729. Both volumes were produced by the Leiden publisher Isaac Severinus.<sup>30</sup> An intended third volume, a *Zee of Water Godgeleerdheid* ('Sea or

27. These translations by Pieter le Clercq are: *Keurige aanmerkingen over alle deelen der natuurkunde, getrokken uit de beste schryvers* (1732); Edmond Halley, *Miscellanea curiosa, of Keurige verzameling van eenige der voornaamste verschijnsels der natuur* (1734); Steven Hales, *Groeiende weegkunde of bericht van eenige weegkundige ondervindingen over het sap in gewassen dienende tot een bewerp eener natuurlyke historie der groeiinge. Mitsgaders eene proeve van de ontbinding der lucht door eene groote verscheidenheit van scheiweegkundige ondervindingen, welke in verscheide byeenkomsten geleezen zyn voor het Koninglyk Genootschap* (1734); *Natuurkundige Aanmerkingen, Waarneemingen en Ondervindingen van de Koninglyke Sociëteit van London; getrokken uit de Philosophical Transactions* (1735); and Francis Hauwkebee [in the English original: Francis Hauksbee], *Natuurkundige en tuigwerkelyke ondervindingen over verscheide onderwerpen* (1735).

28. On the impressive translation work by Pieter le Clercq, see Catharina H. Schoneveld, 'Iets des nazaats waardig: de vertaalarbeid van Pieter le Clercq (1693-1759)', *Documentatieblad Werkgroep Achttiende Eeuw* 24 (1992), p. 217-256.

29. Cf. Piet Visser, 'Redelyke Regtzinnigheid: Prolegomena over de betekenis van Marten Schagen (1700-1770) voor de Nederlandse Verlichting', in *Balanceren op de smalle weg*, ed. Lies Brusse-van der Zee *et al.* (Zoetermeer 2002), p. 216-284.

30. William Derham, *God-leerende natuurkunde; of eene overtuigende betooging van Gods wezen en eigenschappen, uit de beschouwinge van de werken der scheppinge* (Leiden, Isaac Severinus, 1728) and by the same author, *Godgeleerde starrekunde, of eene betooging van*

water theology'), a topic on which Derham had written to Severinus, never appeared in print, probably due to Derham's old age.<sup>31</sup>

Other physico-theological titles to reach publication were Conrad Mel's *Schouw-toneel van Godts wonderen in de werken der natuure, of Nederduytsche physica* ('Theatre of God's miracles in the works of nature, or Dutch physics'), a still Cartesian-inspired book, translated from German by Isaac le Long (1683-1762) and published in 1730 by the Amsterdam publisher Hendrik Vieroot, and John Ray's *Gods wysheid geopenbaard in de werken der schepping* ('Wisdom of God manifested in the works of the creation'), published by Tirion in 1732.<sup>32</sup> Three years later, a monumental fifteen-volume folio edition of Jan Jacob Scheuchzer's *Physica Sacra* was prepared under the Dutch title *Geestelyke Natuurkunde* ('Spiritual physics') by a company of Dutch booksellers, led by the Amsterdam publisher Petrus Schenk. This Dutch edition was enlarged with some comments and poetry by the Dutch authors Gijsbert Tysens and Lambertus Paludanus (or in Dutch: Ten Broeke).<sup>33</sup> Slightly outside the genre but still worthy of mention is a theologically inspired book by the grand master Isaac Newton himself, whose chronological and biblical studies were published in 1737 in a Dutch translation by Abraham de Vrijer, a Mennonite preacher at Wormerveer.<sup>34</sup> Astonishingly, despite Newton's fame no other book by his hand was translated into the Dutch language. In itself, this lack of translation of other works written by the originator of Newtonianism can be seen as an indication

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*Gods wezen en eigenschappen uit de beschouwing der hemelen* (Leiden, Isaac Severinus, 1728 [1729, on the last page]). Both works were re-issued – the first with a slightly changed title *Godgeleerde natuurkunde* – Leiden, Isaac Severinus, 1739 and Amsterdam, Jacobus Loveringh, 1742. The translator of the first book, Abraham van Loon, a graduate from Leiden University (1720), had started the translation as a pastime, serving his own interest. When the Leiden publisher Isaac Severinus learned about this fact, he persuaded Van Loon to bring the manuscript to the press. The translator of the second book, Jan Siewertsz Centen, is given without any reference by T. Dekker, 'De popularisering der natuurwetenschap in Nederland in de achttiende eeuw', *Geloof en Wetenschap* 53 (1955), p. 173-188.

31. Letter of William Derham to Isaac Severinus, 18 March 1727, printed in Derham (1728).
32. Cf. Bots, *Tussen Descartes en Darwin*, p. 83 and p. 88-89. On page 85, Bots also mentions John Denne's *De Wysheid Gods in de schepping der aardgewassen*, a translation mentioned in the *Boekzael* of October 1730 but no copy of this edition could be traced.
33. Cf. *ibid.*, p. 64-65.
34. Izaak [!] Newton, *De Histori der Aloude Volkeren Opgeheldert, en in eene naauwkeurige tydorde geplaatst: Benevens eene korte kronyk van de eerste bekende gebeurtenissen in Europe, tot de verovering van Persië door Alexander den Grooten* (Delft, Pieter van der Kloot, 1737; re-issued with an altered title page in 1763). Translation of *The Chronology of Ancient Kingdoms Amended* (London 1728) and the *Short Chronicle from the First Memory of Things in Europe to the Conquest of Persia by Alexander the Great* (London 1728), both edited by Newton's cousin John Conduit. The Dutch edition was announced in the *Leydsche Courant* of 29 October 1736.

that the Dutch popular interest for natural philosophy was aimed at the theological and social aspects of the study of nature rather than at its profound scientific content.

#### IV. Dutch translations of foreign textbooks on experimental philosophy

How did the Dutch translators deal with their texts? In order to gather some clues about this question, I present a closer look at the first translated textbooks on experimental physics to be produced in response to the growing craze for the subject.

##### *Translations from the English language*

###### a) Desaguliers & Smith, 1731-1753.

The first Dutch translation in this genre was Desaguliers's *De Natuurkunde uit Ondervindingen Opgemaakt*, a translation of the 1735 London edition of Desaguliers's *A Course of Experimental Philosophy*. Already in 1731, in the short outline (*Korte Inhoud*) of Desaguliers's Dutch lessons, it was announced that a larger work in the Dutch language was being prepared that would contain the complete content of Desaguliers's philosophical lessons. However, the *De Natuurkunde uit Ondervindingen Opgemaakt* was not completed until 1736, just a few months after the publication of Van Musschenbroeks *Beginsels der Natuurkunde*.

The identity of Desaguliers's translator is unknown, although an educated guess can be made. According to the title page, he was a 'Liefhebber van de Natuurkunde', that is, 'a lover of physics'. I propose that this translator can be identified as Jacobus Krighout (1703-1770), a man alleged to have been a translator working for Tirion in a similar case.<sup>35</sup> In 1736, Krighout was a Re-

35. In the *Oeuvres de Pierre Camper*, vol. III (Paris 1803), p. 401, it is stated as fact that Jacobus Krighout was the Dutch translator of Robert Smith's *Opticks*. This translation was issued in 1753 by the Amsterdam publisher Isaak Tirion as *Volkomen Samenstel der Optica* (see below, note 45). However, this 1753 Dutch translation was made by the Dutch naturalist Martinus Houttuyn, who revealed this fact in his 1778 edition of the Dutch translation of Baker's *Microscope Made Easy* (see below, note 46). But as Tirion presented Smith's *Volkomen Samenstel der Optica* as a continuation of Desaguliers's three-volume textbook on physics, it is highly probable that the above mentioned Petrus Camper, who acted as Krighout's colleague as an Amsterdam professor from 1755 until 1761, has confused both editions. Camper's erroneous identification was followed by the late historian of philosophy Michael J. Petry in his *Frans Hemsterhuis: Waarneming en werkelijkheid* (Baarn 1988),

monstrant minister at the village of Zevenhuizen, where he collaborated as a meteorological observer in the network of the Utrecht professor of natural philosophy Petrus van Musschenbroek.<sup>36</sup> In 1747, after having served the Remonstrant churches of Utrecht and Leiden, Krighout became a professor of theology at the Amsterdam Remonstrant Seminary where he remained in active duty until his retirement in 1767.<sup>37</sup> The catalogue of Krighout's library (auctioned in 1770) has a very impressive section on natural philosophy, listing some 1,400 items, many of these multi-volumes. Krighout possessed the transactions of almost every learned society throughout Europe. From this observation it can be deduced that, although he never published anything under his own name, Krighout must have studied the subject with the intensity of a true 'lover of physics'.

In any case, in a preface, Desaguliers's translator gives account of his intentions and of the procedures he had followed. It seems clear that physico-theological inspiration was one of his main underlying motives to undertake the translation. The usefulness of physics for the study of theology had already been demonstrated by the 'outstanding works of Nieuwentyt, Derham, Ray and others',<sup>38</sup> he stated, so it was unnecessary to sing the praises of natural knowledge. As a person deeply interested in the subject, he was frequently asked by his friends to translate Desaguliers's work. But at first he had refused the task, because 'he had enough work to do with his own [primary] studies, and because he was reluctant to face the difficulties that would come across in such a huge undertaking'.<sup>39</sup> A problem in that respect was that most subjects treated by Desaguliers had never before been discussed in the Dutch language. As a consequence, quite a number of artificial words (*kunst-*

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p. 137. In the auction sale catalogue of Krighout's library, the *Bibliotheca Krighoutiana* (Amsterdam 1770), both the English editions and Dutch translations of Desaguliers's as well as Smith's books are mentioned; both Dutch translations as luxurious copies on 'large paper' ('Groot papier'), nos. Q 1263/64 and Q 1392/93.

36. Petrus van Musschenbroek, *Beginsels der Natuurkunde*, 2<sup>nd</sup> ed. (Leiden 1739), p. 304 and p. 767.

37. Cf. *Ter inwynging van den heere Jakobus Krighout: toen zyn Hoog-Eerwaarde het ampt van hoogleeraar in de H. Godgeleerdheid onder de remonstranten, plegtig aanvaarde: op den 6. der Sprokkelmaand 1747* (n.pl.; n.d.). Printed poem by Pieter Huizinga Bakker, 9 pages, Leeuwarden Tresoar, classmark Pc 3861. See also: Abraham des Amorje van der Hoeven, *Het tweede eeuwfeest van het seminarium de remonstranten te Amsterdam* (Amsterdam 1840), p. 183-186.

38. '[...] het voortreffelyke Werk van den Heer Nieuwentyt, en de vertaalde werken van de Heeren Derham, Ray, het uittrekzel van Dr. Cheyne en anderen.' 'Berigt van den vertaler' (the mentioned 'preface'), in *De Natuurkunde uit Ondervindingen Opgemaakt*, vol. I (Amsterdam, I. Tirion, 1736), p. i.

39. '[...] omdat ik werks genoeg had aan mijne eigen studie, als om de moeijelykheid die ik in de Vertaling te gemoed zag.' 'Berigt van den vertaler', p. ii.

woorden) had to be invented. Older books in Dutch were of little use in these matters because in these earlier works ‘our Dutch mathematicians’<sup>40</sup> mostly had maintained the original Latin or Greek expressions. In other cases, they had used language that had not adequately represented the subjects these words sought to express. But in due time, the translator had agreed to devote his spare time to Desaguliers’s translation, although he preferred that someone involved in the daily study of physics take up this difficult task.

With regard to his audience, the translator declared that he aimed at enthusiasts who did not possess any training in physics. After all, those with such an education already had easy access to the original English edition. As far as the translation itself was concerned, in those cases where the translator had used *kunstwoorden*, he had maintained the original expressions mixed in the Dutch text in brackets. Thus, in the first chapter, newly invented words like ‘Misloper’ for ‘Asymptoot’,<sup>41</sup> and ‘Bol-deel’ for ‘Segment’<sup>42</sup> are found. These were Dutch-sounding words which in fact never reached the official dictionaries of the Dutch language. In an attempt to find satisfactory names for several of the scientific instruments, the translator had consulted those Dutch ‘artisans and amateurs, who themselves construct such instruments or know how to use them’.<sup>43</sup> In other cases, he was concerned as to whether the invented words reflected the subject matter adequately. Only a few times, he had left some words untranslated because they were already properly defined in the text.

In 1746, a second volume followed. The long delay had not been foreseen. To no small extent, it had been caused by Desaguliers himself who had followed Van Musschenbroek’s advice to suspend the completion of his textbook until the moment that the revised edition of ’s-Gravesande’s physics manual had been published. In his preface, the Dutch translator (Krighout?) complained about the delay. Had he known from the outset that the process of translating would take more than a decade, he would never have undertaken the painstaking task; it had deflected him too much from his primary (theological?) course of study. In 1745, after the publication of Desaguliers’s second English volume, he had expressed reservations over continuing his task. Eventually, the conclusion was formed that a point of no return had been passed; too much work had already been done to abort the translation. This was especially because, he wrote, ‘the enthusiasm for the useful know-

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40. That is: ‘onze Nederlandse wiskunstenars’. ‘Berigt van den vertaler’, p. ii.

41. *De Natuurkunde uit Ondervindingen Opgemaakt*, I.31.

42. *Ibid.*, I.43.

43. ‘Om de werktuigen of instrumenten met hare eigen nederduitse namen te noemen, heb ik, indien ze my niet regt bekend waren, dezelve gevraagd aan Kunstenars en Liefhebbers, die de instrumenten zelf maken, of gebruiken.’ ‘Berigt van den vertaler’, p. ii.

ledge of physics is at a very high level these days'.<sup>44</sup> This popularity had inspired the translator to supplement Desaguliers's translation with an additional third volume (one more than the original English edition), in which he planned to include parts of Robert Smith's *A Compleat System of Opticks* (London 1738), as Desaguliers had discussed this subject only briefly.

However, in 1751, upon the publication of this third volume, it appeared that the publisher Isaac Tirion had altered his plans. Instead of translating only parts of Smith's book, Tirion had decided to publish a complete translation, in a similar scheme and design to Desaguliers's textbook. Another Dutch 'Lover of Mathematics and Physics'<sup>45</sup> was already engaged for this project. This was Martinus Houttuyn (1720-1798), a young medical doctor of Mennonite descent who had graduated from Leiden University in 1749. Houttuyn would devote his life to the advancement and dissemination of natural knowledge in the Netherlands. His catalogue of translations and original publications in a range of fields is enormous.<sup>46</sup> In 1753 the two-volume edition of Smith's *Volkomen Samenstel der Optica* was published, being cleverly presented by Tirion as a continuation of Desaguliers's *Natuurkunde*.<sup>47</sup> The book contained a subscription list revealing the names of 176 Dutch 'enthusiasts': various merchant-scientists, instrument makers and other interested parties.<sup>48</sup> Thus, with this change of concept, the third volume of Desa-

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44. 'De Liefhebberij voor de nutte wetenschap van de Natuurkunde, die tegenwoordig in ons land zeer groot is [...]': 'Berigt van den Vertaler', *De Natuurkunde uit Ondervindingen Opge maakt*, vol. II (Amsterdam 1746), p. i.

45. That is: 'Vertaald door een Liefhebber der Wiskonst en Natuurkunde'. Robert Smith, *Volkomen Samenstel Der Optica of Gezigkunde, Behelzende eene Gemeenzaame, eene Wiskonstige, eene Werktuiglyke en eene Natuurkundige Verhandeling: Verrykt met veele Aanmerkingen van den Schryver, als mede met eene Verhandeling van Dr. Jurin over het duidelyk en onduidelyk zien* (Amsterdam, Isaak Tirion, 1753), title page.

46. Martinus Houttuyn revealed his identity as translator of Smith's *A Compleat System of Opticks* (1738) in two footnotes in one of his other translated works (Baker 1778), p. 354 and p. 435 (see below, note 56). Cf. Marinus Boeseman and Wilhelmina de Ligny, *Martinus Houttuyn (1720-1798) and his contributions to the natural sciences, with emphasis on zoology* (Leiden 2004), p. 98-99.

47. The publication was dedicated to Willem Bentinck, Count of Rhoon, a Dutch-English aristocrat and, at that time, one of the most influential politicians in the Dutch Republic. In 1764, the remnant of this edition was re-issued with a new title page by Engelbrecht Boucquet and Company at The Hague. See also Tirion's 1751-prospectus in UB Amsterdam, KVB PPA 645:20.

48. For a discussion of the subscription list in Smith's *Volkomen Samenstel Der Optica* (1751-1753), see Zuidervaart, *Van 'Konstgenoten' en Hemelse Fenomenen*, p. 265-267. For the analysis of the subscription list in the Dutch translation of the four-volume astronomical textbook by Joseph Jérôme de Lalande, *Astronomia of sterrekunde* (Amsterdam, Morterre, 1773-1780), translated from the French by the mathematician Arnoldus Bastiaan Strabbe, see *ibid.*, p. 347-356.

gulers's *Natuurkunde* became a kind of patchwork, filled only with some additions and articles that Desaguliers had published in the *Philosophical Transactions*. An index of the *kunstwoorden* ended this small volume. With its publication, a translating project of some twenty years had been brought to a successful close. To mark the event, Tirion added a preface to the first volume, in which he dedicated the completed translation to the Amsterdam burgomaster and director of the Dutch East India Company, Gerard Arnout Hasselaer, a well known Maecenas of the arts and sciences and a man who privately owned one of the largest cabinets of scientific instruments in the Netherlands.<sup>49</sup>

b) Other translations from the English language, 1737-1756.

Since the early 1730s, Tirion had published several other Dutch translations of English works on experimental philosophy. In 1737, he already had made a Dutch edition of Benjamin Martin's *The Philosophical Grammar*. This book was translated by his regular assistant Jan Wagenaar and was released with the title *De Filozoofische Onderwyzer of Algemeene Schets der Heden-daagsche Ondervindelyke Natuurkunde* ('The Philosophical teacher or general sketch of the present state of experimental physics'). Wagenaar added a 'Voorreden van den Overzetter' ('Preface by the translator'), in which he explained his motives and methods. The translation, he stated, was intended for 'mingeoeffenden' or unpractised persons in physics. The available works in the Dutch language, like Van Musschenbroek's *Beginzelen der Natuurkunde*, had been written for 'a more high-minded kind of enthusiast'.<sup>50</sup> Female readers especially would not be reached by this kind of literature. Therefore, he regarded Martin's book as suitable for all social circles in which the study of physics was practised (illustrated to an extent by Wagenaar's statement mentioned in the introduction of this article). Martin's original text was altered or expanded in only a few cases, marked by text in square brackets. Wherever the English author had used Greek expressions unknown to the common Dutch reader, Wagenaar had taken the liberty of choosing his own words. In general, he hoped that his efforts would stimulate reverence for their divine creator in his compatriots.

In 1744, a second edition of the *Filozoofische Onderwyzer* was issued, enlarged with additions on mechanics and optics. As Wagenaar was engaged

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49. Cf. Tiemen Cocquyt, 'The Hasselaer auction of 1776: the transmission of scientific instruments from the public to the academic sphere', *Rittenhouse: the journal of the American Scientific Instrument Enterprise* 22 (2009), p. 70-89.

50. '[...] maar die Heer [Van Musschenbroek] heeft voor een verhevener slag van liefhebbers geschreeven.' Benjamin Martin, *Filozoofische Onderwyzer of Algemeene Schets der Heden-daagsche Ondervindelyke Natuurkunde*, 2<sup>nd</sup> ed. (Amsterdam 1744), p. vi.

with another ambitious project at that time, which eventually would make him one of Holland's most important historians of the eighteenth century,<sup>51</sup> this second edition was prepared by the Mennonite physician Joannes Grashuis. He probably also edited the 1765 third edition, at that time published by Frans Houttuyn, who will be discussed later.<sup>52</sup>

In the 1740s and 1750s, Tirion and other Dutch publishers continued to release additional Dutch translations regarding experimental philosophy and the scientific instruments used in its practice.<sup>53</sup> In 1744, for instance, Tirion published Richard Bradley's *Wysgeerige Verhandeling van de Werken der Natuure* ('Philosophical treatise of the works of nature') as well as Henry Baker's *Het Microscop Gemakkelyk Gemaakt* ('The Microscope made easy'). The latter translation was made by 'a learned and linguistic gentleman'.<sup>54</sup> According to a handwritten note on a preserved copy, this was most likely Mattheus Huisinga, a medical doctor who had graduated from Leiden University in 1734.<sup>55</sup> Martinus Houttuyn enlarged this edition in 1756, when it was issued with a changed title. Houttuyn also edited the 1778 edition, both reprints being brought to the market by his Amsterdam cousin, the Mennonite publisher Frans Houttuyn.<sup>56</sup>

c) Journals, mainly with translated articles from Britain.

Essentially, Frans Houttuyn continued the role Tirion had played earlier in disseminating popular Newtonianism. Houttuyn even had a small portrait of Newton included as a symbol in his printer's mark. With his industrious

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51. Jan Wagenaar, *Vaderlandsche historie, vervattende de geschiedenissen der nu Vereenigde Nederlanden, inzonderheid die van Holland, van de vroegste tyden af, uit de geloofwaardigste schryvers en egte gedenkstukken samengesteld*, 21 vols (Amsterdam, Isaak Tirion, 1749-1759).

52. The Mennonite physician Joannes Grashuis (1699-1772) from Groningen had graduated from Leiden University in 1722. He lived in Amsterdam from at least 1735 onwards. In the 1750s, Tirion published several medical works of his hand.

53. Cf. Roger Cotes, *Lessen en Proefondervindingen over de Waterweegkunde en Lugt* (Leiden, Jakob van der Kluis, 1740; re-issued Amsterdam, Pieter Spriet, 1752).

54. That is: 'een geleerd en taalkundig heer'. Henry Baker, *Het Microscop Gemakkelyk Gemaakt* (Amsterdam, I. Tirion, 1744), p. i ('Voorbericht van den drukker').

55. Boeseman and De Ligny, *Martinus Houttuyn (1720-1798) and his contributions to the natural sciences*, p. 102.

56. Henry Baker, *Nuttig gebruik van het mikroskoop, of handleiding tot nieuwe waarneemingen omtrent de configuratiën en krystallen der zouten* (Amsterdam, Frans Houttuyn, 1756) and Henry Baker, *Het mikroskoop gemakkelyk gemaakt, of gemeenzaame beschryving, van allerley werktuigen, die men gebruikt om zeer kleine diertjes en andere voorwerpen, klaar en duidelyk, vergroot zynde, te beschouwen; met al het gene daar toe behoort: vervolgd met een berigt van de verbaazende ontdekkingen, die door middel van vergrootglazen gedaan zyn* (Amsterdam, Erven Frans Houttuyn, 1778). Cf. Boeseman and De Ligny, *Martinus Houttuyn (1720-1798) and his contributions to the natural sciences*, p. 99-101.

cousin Martinus Houttuyn, he also revived Tirion's initiative of a scholarly periodical which he presented as the continuation of Tirion's *Uitgeleeze Natuurkundige Verhandelingen*.<sup>57</sup> In 1757, both cousins started the *Uitgezogte Verhandelingen uit de nieuwste werken van de Societeiten der Wetenschappen in Europa en van andere Geleerde Mannen* ('Selected treatises from the newest works of the learned societies of Europe and of other learned men'), a scholarly journal with a mixture of translated and original articles from the scientific field. This important and successful journal would last some nine years, ending in 1765, after having produced ten well edited and illustrated quarto volumes.<sup>58</sup>

Earlier, a similar initiative by the Mennonite publisher Jan Bosch from Haarlem had failed to survive. Bosch, who was a brother-in-law of the Amsterdam publisher and prolific translator Marten Schagen, was an active member of the Haarlem-based 'Natuur- en Sterrekundig Collegie' (a local 'Physics and Astronomical Society').<sup>59</sup> In 1750, he had taken the initiative to start a quarterly, the *Hollands Magazijn*, a periodical inspired by the London *Gentleman's Magazine* that intended to feature scientific news from home and abroad. According to the prospectus of the new journal, Bosch expected the founding of an official learned society by the recently restored Dutch stadholder, Prince William IV of Orange, backed by his government. In anticipation of things to come, Bosch was of the opinion that it was not wise to sit idle. He therefore called for the help of 'all lovers of the useful sciences' to contribute to his journal.<sup>60</sup> Bosch's appeal drew little response. The journal

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57. In 1764, Frans Houttuyn re-issued the remaining stock of Tirion's journal, the *Uitgeleeze Natuurkundige Verhandelingen*, with a new printed title and added a final quire to it. For Houttuyn's work as a publisher see Keith L. Sprunger, 'Frans Houttuyn, Amsterdams boekverkoper: preken, uitgeven en de doopsgezinde Verlichting', *Doopsgezinde bijdragen* 31 (2005), p. 183-204.

58. Boeseman and De Ligny, *Martinus Houttuyn (1720-1798) and his contributions to the natural sciences*, p. 103-114. In 1772, the Amsterdam publisher Albert van der Kroe again picked up the baton with a similar journal, entitled *Natuurkundige verhandelingen, of verzameling van stukken de natuurkunde, geneeskunde, oeconomie, natuurlijke historie enz. betreffende*, bringing translated articles from foreign journals. This periodical lasted until 1777. Cf. Constant Charles Delprat, *De geschiedenis der Nederlandsche geneeskundige tijdschriften* (Amsterdam 1927), p. 28-33.

59. See for the 'Natuur- en Sterrekundig Collegie', operational at Haarlem from 1731 until 1788, Bert C. Sliggers, 'Honderd jaar natuurkundige amateurs in Haarlem', in *Een elektriserend geleerde: Martinus van Marum, 1750-1837*, ed. Anton Wiechmann (Haarlem 1987), p. 67-102.

60. That is: 'alle liefhebbers van de nutte wetenschappen'. Jan Bosch, *Bericht raakende de aanleg van een nieuw werkje onder den tytel van Hollands Magazyn, het welk J. Bosch te Haarlem, alle liefhebbers van nutte wetenschappen, verzoekt te helpen aanvullen; en waaruit hy nu en dan een stukje in groot octavo hoopt in 't licht te geeven* (Haarlem [n.d., c. 1750]). Prospectus bound in the copy of the *Hollands Magazijn* at the library of Leiden University.

appeared only in some quires from 1750 until 1752, and – irregularly – again from 1756 until 1761.<sup>61</sup> At first Bosch offered articles from foreign journals (in some cases translated by Van Schagen) in the *Hollands Magazijn* as well as the results of some observations and experiments produced within his Haarlem society of physics enthusiasts.<sup>62</sup> A change came in 1752 when the ‘Hollandsche Maatschappij der Wetenschappen’ was founded in Haarlem as the first official learned society of the Netherlands. Initially, the *Hollands Magazijn* was to be converted into their official journal. However, this did not transpire as planned. After 1754 Bosch printed two separate journals: the first, the *Verhandelingen*, served as the official organ of the ‘Hollandsche Maatschappij’. This journal presented only the results of new scholarly research, whereas the second journal, the *Hollands Magazijn*, would cover only literature written in languages other than Dutch. However, after 1756, Bosch lacked editorial staff, so only a few volumes of the *Hollands Magazijn* would see publication. The *Verhandelingen* of the ‘Hollandsche Maatschappij’, by contrast, were a great success. Bosch would publish and partly reprint these transactions until his death.<sup>63</sup>

Another noteworthy translation project began in 1757. This was the Dutch translation of Benjamin Martin’s popular journal *The General Magazine of Arts and Sciences*, originally published in London during the years 1755–1765. The Dutch version, the *Algemeene Oefenschoole van Konsten en Weetenschappen* (‘The General training school for the arts and sciences’) would last decidedly longer, from 1757 until 1782, and with additions it

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61. *Hollands Magazijn, voorzien van aardrijkskundige, historische, philosophische, geneeskundige, regtsgeleerde, godgeleerde, en poëtische aanmerkingen, beschryvingen, brieven, proeven, schetsen, uittreksels, vragen en waarnemingen*, 3 vols in 6 bindings (Haarlem, Jan Bosch, 1750–1752 and 1756–1761).

62. Cf. *Hollands Magazijn* 1 (1750), p. 394–408.

63. At Haarlem, Jan Bosch (1713–1780) also published some translations in the fields of astronomy, geography and physico-theology, like Johannes Leonardus Rost, *Beginselen der waare sterrekunde*, transl. from the German by Van Schagen and Bosch, and checked by ‘a gentleman of fame in the commonwealth of literature’ (1748); Bernhard Varenius, *Volkomen samenstel der aardryks beschryvinge*, transl. from the English edition made by Isaac Newton (1750); Julius Bernard von Rohr, *Godleerende plantkunde; of reden- en schriftmatige proeve uit het ryk der gewassen, ten betooge van de almagt, wysheit, goedheit, en regtvaardigheid des grooten Scheppers en Onderhouders van alle dingen, in combination with J. A. Fabricius, Aehangsel; bestaende in een schets der godleerende waterkunde; in ’t ontwerp eener godleerende vuurkunde; en in een aenpryzyng van ’t godverheerlykend beschouwen der natuure*, transl. from the German by Van Schagen (1764); Nikolaus Schmid, *De Beschouwing van het Wereldgestel gemakkelyk gemaakt. Ter verkryginge eener Algemeene kennisse der groote werken van God*, transl. from the German (1774); and Johann Elert Bode, *Handleiding tot de kennis van den sterrenhemel*, transl. from the German (1779).

would expand considerably.<sup>64</sup> The work was published by Pieter Meijer (1718-1781), one of the more influential figures in the Dutch book market, and who focussed on Dutch literature. Friedrich Karl Heinrich Kossmann has suggested that Meijer's enterprise was in fact to a large extent the work of a group of young intellectuals that gathered regularly in Meijer's lodgings. At least, it is known that parts of the work for the *Oefenschoole* were done by Pieter van den Bosch. Born a citizen of Amsterdam, he became a Remonstrant in 1755, to be made a minister soon afterwards.<sup>65</sup>

The *Algemeene Oefenschoole* was divided into six sections: natural philosophy, geometry, literature, mathematics, biography and miscellaneous. Although the bound set has the appearance of a serial publication, the Dutch edition strictly followed the English example, which was published in monthly parts, each copy having text for every section, with continuous pagination for each section.<sup>66</sup> This had the consequence that sometimes the text of an article was stopped in the middle of a sentence. Only after the completion of a volume were separate sections gathered and combined into separately bound section-volumes. During the run of the *Algemeene Oefenschoole*, this happened only three times, in 1763, 1770, and 1782. Millburn has established for the English original that this manufacturing process of gathering and binding at a much later date than the distribution of the separate issues almost always resulted in a loss of maps and engraved plates. He even states: 'such is the variation between extant copies of the General Magazine volumes, that it is practically impossible to say precisely what they ought to contain'.<sup>67</sup> The Dutch imitation seems to suffer from the same deficiencies. As far as the content is concerned, whereas the first five sections did follow the English model quite accurately, most of the miscellaneous section ('mengelwerk van vernuft, konst, geleerdheid') was adapted for the Dutch market. It contained several fabricated letters which always were written under a pen name. The content and form of these letters closely followed the so-called spectatorial genre of publishing that at the time was very popular in the Netherlands. As a consequence, the *Algemeene Oefenschoole* expanded considerably. While the English original stopped in 1764 after 117 instalments with some 6,300 pages

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64. The start of the *Oefenschoole* series can be deduced from some (Dutch) engravings, of which the earliest is dated 1757.

65. Cf. Friedrich K. H. Kossmann, *Opkomst en voortgang van de Maatschappij der Nederlandse Letterkunde te Leiden: geschiedenis van een initiatief* (Leiden 1966), p. 77, quoting a letter from Van Lelyveld to Van Goens of 11 April 1766.

66. John R. Millburn, 'Martin's magazine: the general magazine of arts and sciences, 1755-65', *The Library, transactions of the bibliographical society*, 5.28 (1973), p. 221-239. See also his biography: John R. Millburn, *Benjamin Martin: author, instrument-maker and 'country showman'* (Leiden 1976).

67. Millburn, *Benjamin Martin*, p. 70.

with more than 200 plates, bound in thirteen volumes, the *Algemeene Oefenschoole* ceased production in 1782 after some 14,500 pages with about 140 plates, bound in thirty volumes. All plates were re-engraved in the Netherlands, with the result that the image has been mirrored in some cases.

d) Children's books.

The first part of the *Algemeene Oefenschoole* contained a translation of Martin's *Young Gentlemans Philosophy*. These three octavo volumes, bound together in 1763, presented to the Dutch public the first book on experimental science especially aimed towards an audience of youngsters.<sup>68</sup> Also targeting this market was the Dutch translation of John Newbery's *Philosophy of Tops and Balls* (1761), a small booklet for 'the first youth', presenting an introduction to the Newtonian philosophy of nature covering basic physics, astronomy, geography, natural history and science, all with his characteristic emphasis on good-humoured enjoyment of the subject. It was published in Middelburg in 1768, with the title *Philosophie der tollen en ballen, of het Newtoniaansche zamenstel van wysbegeerte, geschikt naar de vatbaarheid der eerste jeugd*.<sup>69</sup> The book probably was translated by – or at the instigation of – Johannes Nettis, a Mennonite ophthalmologist, at the time the leader of an informal society of physics enthusiasts in that city.<sup>70</sup>

### *Translations from the German language*

The experimental approach to scientific knowledge was neither exclusively Newtonian nor English in character. The Dutch Republic, as a transit nation for goods and ideas was also influenced by developments from the Continent. In Germany, for instance, philosophers including Wolff and Leibniz had a contrasting perspective on natural science, especially in allowing metaphy-

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68. The Dutch translation was entitled *De wysbegeerte voor jonge heeren en jufferen, of, achter-eenvolgende beschouwingen van de werken der natuur*. Around this period, Pieter Meijer also published a similar work on astronomy, also translated from the English: James Ferguson, *De Starrekunde voor Jonge Heeren en Jufferen, op eene gemeenzaame wyze verhandeld in tien samenspraaken, tusschen Neander en Eudisia* (Amsterdam 1771).

69. The book was published by the local bookseller Christiaan van Bohemer. In 1783, the remnant of the stock was re-issued by the Middelburg bookseller Willem Abrahams.

70. The Dutch translation of Newbery's book has two references to articles produced by Johannes Nettis (1707-1777). In his youth, Nettis had lived at Amsterdam, then being friendly with Lambert ten Kate whose optical studies Nettis published later in life. In 1751, he was appointed 'Oculist' of stadholder Prince William IV of Orange. His pupil Leendert Bomme testified in 1781 that for some years, he had attended the physics society lead by Nettis in Middelburg. Cf. Zuidervaart, *Van 'Konstgenoten' en Hemelse Fenomenen*, p. 392.

sical reasoning a place in their system of scientific knowledge. Nevertheless, they too valued the experimental method as key for the study of nature. In the Netherlands, Wolffianism was also taught at some universities, for instance, those of Groningen and Franeker.

As a result of the craze for experimental physics in the 1730s, the complete philosophical and mathematical works of Christian Wolff were also translated. This project had been started in 1738 by Johann Christoffel von Sprögel, a physician born in Hamburg and trained in Halle.<sup>71</sup> Von Sprögel had settled in Amsterdam in about 1720, where he quickly proved to be a man of erudition and with considerable practical and theoretical skills. In 1722, he obtained a patent for a 'newly invented fire-extinguishing machine'.<sup>72</sup> According to a preserved prospectus, Von Sprögel started, in 1736, a 'collegium' of apothecaries and other enthusiasts, to whom he gave lessons in physics and chemistry. In 1741, he signed a contract as a 'master smelter and separator of minerals and metals' for a mining project in Brazil, financed by one of his Amsterdam acquaintances. In the years 1742-1743, the Amsterdam publisher Janssoons van Waesberge issued Wolff's *Experimentaal-Philosophie* as Von Sprögel's last translation.<sup>73</sup> He had translated the well-illustrated octavo editions in a straightforward and accurate manner, with no additions, comments or added footnotes. Von Sprögel only occasionally referred to key words with their Latin synonyms in brackets. These are absent in the original German editions.

Another German dictionary on the natural and mathematical sciences, the *Volkommen wiskundig woordenboek*, aimed at a public of 'learned as well as untrained devotees of the mathematical sciences',<sup>74</sup> but giving also an introduction to experimental philosophy, was translated in 1739 by Joan Levinus Stammetz, a law student from Vienna who enrolled at Leiden University in 1730. Four years later, he entered the service of Felix de Klopper, a Leiden

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71. For Von Sprögel's translations, see Michiel R. Wielema, 'Christiaan Wolff in het Nederlands: de achttiende-eeuwse vertalingen van zijn Duits-talig oeuvre (1738-1768)', *Geschiedenis van de wijsbegeerte in Nederland* 1 (1990), p. 55-72. Reprinted in his thesis *Ketters en Verlichters: de Invloed van het Spinozisme en Wolffianisme op de Verlichting in Gereformeerd Nederland*, Diss. Vrije Universiteit Amsterdam (1999), p. 116-119. See also Zuidervaart, 'Reflecting "popular culture"', p. 422-423.

72. That is: 'nieuw geïnventeerde vuurbusschende machine'. Cf. Gerard Doorman, *Octrooien voor uitvindingen in de Nederlanden uit de 16e-18e eeuw* ('s-Gravenhage 1940), p. 308. Von Sprögel originally applied for a patent together with Zacharias Gryl, who died in 1722.

73. Christiaan Wolff, *Experimentaal-Philosophie of Nuttelyke Proefnemingen, waardoor tot een grondige kennisse der Natuur en Konst de weg gebaant word*, 3 vols (Amsterdam, Janssoons van Waesberge, 1741-1742). Cf. Wielema, 'Christiaan Wolff in het Nederlands', p. 121. Von Sprögel's translating work on the remnant of Wolff's oeuvre was continued by Frederik Marci, a mathematician living at Amersfoort.

74. That is: 'geleerde en ongeleerde liefhebbers der wiskunstige weetenschappen'.

courantier. The book was supervised by Willem La Bordus, a lecturer in (Dutch) mathematics at Leiden University who declared in the preface that a dictionary of the new *kunstwoorden* had become something of a necessity since the publication of the works of Van Musschenbroek, Desaguliers, Derham and others.<sup>75</sup>

Apart from some early works on electricity,<sup>76</sup> these German translations did not attract as much attention as the products of English or French origin. The low profile of German physics seems to be confirmed by the relatively low print run (200 copies) of the Dutch edition of Johann Heinrich Winkler's *Anfangsgründe der Physic* (1753).<sup>77</sup> Its Dutch translation, plainly entitled *Beginselen der Natuurkunde* was issued in 1768 in a collaboration between the Amsterdam publisher Johannes Loveringh and his pupil, the Dordrecht publisher Pieter Blussé. According to Arianne Baggerman, the edition was supervised by Benjamin Bosma, an Amsterdam lecturer in (Wolffian) physics, who had published his own physics textbook *Gronden der Natuurkunde* in 1764.<sup>78</sup> It is remarkable that both publishers had attended Bosma's lessons. It is also interesting that in the 1760s, according to the 'preface of the translator', physico-theological inspiration had still been one of the main motives to translate this physics textbook.<sup>79</sup>

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75. *Volkoomen wiskundig woordenboek, daar in alle kunstwoorden en zaaken, welke in de beschouwende, en oeffenende wiskunst voorkomen, duidelyk verklaart worden; in welk mede verscheide zaaken de historie der wiskunstige weetenschappen raakende vermengt zyn [...]* Tot nut der geleerde en ongeleerde liefhebbers der wiskunstige weetenschappen (Leiden, Coenraad Wishoff & Georg Jacob Wishoff Czn, 1740). The book was re-issued twice with a changed title as *Groot en volledig woordenboek der wiskunde, sterrekunde, meetkunde, rekenkunde, tuigwerkkunde, burger-, scheeps- en krygsbouwkunde, gezichtkunde, water- en vuurwerkkunde, benevens andere nuttige kunsten en wetenschappen* (Amsterdam, Steven van Esveldt, 1758; 2<sup>nd</sup> ed. Johannes Wessing Willemsz., 1772).

76. Cf. the combined edition of the translation of three German books on electricity in 1745: (1) Johann Heinrich Winkler, *Nieuwe natuurkundige ontdekkingen, aangaande de eigenschappen, werkingen en oorzaken der electriciteit of uitlokkingskracht, benevens eene beschryvinge van verscheide nieuwe electricische werktuigen*; (2) Johann Heinrich Winkler, *De eigenschappen der electricische stoffe, en van het electricische vuur, uit verscheidene nieuwe proeven verklaart*; and (3) Jakob Sigismund von Waitz, *Verhandeling over de Electriciteit, en derzelver oorzaken* (Amsterdam, Hendrik Vieroot, 1745; 2<sup>nd</sup> ed. H. Vieroot and D. Slightenhorst, 1746; 3<sup>rd</sup> ed. H. W. van Welbergen, 1751). See also Christian Gottlieb Kratzenstein, *Korte verhandeling van de oorzaken der electriciteyt [...], naar den 2den druk uit het Hoogduits vertaalt* (The Hague, Pieter van Cleef, 1745).

77. Johann Heinrich Winkler, *Beginselen der Natuurkunde. Naar den tweeden verbeterden Hoogduitschen druk vertaald* (Amsterdam, Jacobus Loveringh and Dordrecht, Abraham Blussé, 1768). The print run of this book was mentioned in some newspaper advertisements, for instance in the *Middelburgsche Courant* of 12 October 1775.

78. Cf. Arianne Baggerman, *Een lot uit de loterij: het wel en wee van een uitgeversfamilie [Blussé] in de achttiende eeuw* (The Hague 2001), p. 34.

79. See also the translations from the German published by Jan Bosch, mentioned in note 63.

### *Translations from the Latin language*

Popular texts have rarely been written in Latin, and only very few Latin texts on experimental philosophy or Newtonian physics were translated into the Dutch language. The first of this kind was made in 1741 by the Zutphen lawyer Johan Lulofs who presented a translation of John Keill's *Introductio Ad Veram Physicam* (Oxford 1701) and *Introductio ad veram astronomiam* (Oxford 1718) to the Dutch public.<sup>80</sup> These two books were based on a series of experimental lectures on Newtonian natural philosophy that Keill had been giving at Oxford since 1694: the first lectures of this kind. Lulofs based his translation on the Leiden edition that had been prepared in 1725 by 's-Gravesande, an edition including three short texts that had been published elsewhere.<sup>81</sup> The most important of these was a paper Keill had published in 1708 in *Philosophical Transactions* as the first attempt to extend Newton's principle of gravitational attraction to a supposed attraction between smaller particles. Lulofs annotated his *Inleidinge Tot de waare Natuur- en Sterrekunde* ('Introduction to the true physics and astronomy') with scholarly notes and references to more recently published literature. In his preface, Lulofs stated that such a learned work as Keill's could not be translated by 'rented quills', but had to be performed by 'those not untrained in geometry, algebra, physics and astronomy'.<sup>82</sup> He therefore began the project, but was hindered in his translation by the fact that little had been written on this topic 'in his mother tongue'. The invention of *kunstwoorden* had especially posed him with problems in translation on several occasions. In most cases he preferred to coin a hybrid term directly related to a word Keill had used in his Latin edi-

80. In 1740, Lulofs had already made a Dutch translation of a Latin book on astronomy written by the Danish scholar Petrus Horrebow. This book was published as *De zegepralende Copernicus of eene verhandeling over het verschilzigt des jaarlykschen loopkrings, waar in uit een menigte van sterrekundige waarnemingen de beweginge des aardkloots rondom de zon, betoogt word* (Zutphen, Jan van Hoorn, 1741).

81. John Keill, *Inleidinge Tot de waare Natuur- en Sterrekunde*, [...] *Waarbij gevoegt zyn deszelfs Verhandelingen over de Platte en Klootsche Driehoeks-Rekening, over de Middelpunts-Kragten en over de Wetten der Aantrekkinge. Uit het Latyn vertaald, en met eenige Aantekeningen en Byvoegsels verrykt door Johan Lulofs* (Leiden, Jan and Hermanus Verbeek, 1741). As late as 1802, this Dutch translation served as the source for a Japanese edition, published by Shizuki Tadao (1760-1806). Cf. T. Hayashi (with notes by J. C. Kluyver), 'A list of some Dutch astronomical works imported into Japan from Holland', *Nieuw archief voor wiskunde* 7 (1907), p. 230-237.

82. '[...] zeer wel wetende, dat de vertalinge van dusdanige werken niet door gehuurde pennen, maar door zodanige moest geschieden, die niet onervaren zyn in de Meet-, Stel-, Natuur- en Sterrekunde.' John Keill, *Inleidinge tot de waare Natuur- en Sterrekunde*, 'Voorreden van den Vertaler'.

tion. His Dutch translation aided Lulofs's path towards an academic chair; in 1742, he was asked to succeed the late 's-Gravesande at Leiden University.

Perhaps inspired by Lulofs's translation, the same Leiden publishers, Jan and Hermanus Verbeek, presented a Dutch translation of 's-Gravesande's renowned textbook in 1743, a third Latin edition of which had been published earlier that year, shortly after 's-Gravesande's death. However, the scholarly tone of this book did not meet with popular demand. Although the book included fine illustrations, the text appears to have proved too difficult for the common Dutch reader. Thus, only the first volume of the translation appeared in print. Evidently, connoisseurs preferred the original Latin edition.<sup>83</sup> 's-Gravesande's work had been translated by Jan Engelman, a physician from Haarlem and a former student of Petrus van Musschenbroek. In his home town, Engelman had been the leader of the 'Natuur- en Sterrekundig Collegie' for a decade.<sup>84</sup> This was a local society devoted to the study of physics and astronomy, a forerunner for the foundation, in 1752, of the 'Hollandsche Maatschappij der Wetenschappen'.<sup>85</sup>

### *Translations from the French language*

The translation of French books on experimental philosophy commenced somewhat belatedly. D'Alencé's seventeenth-century book on meteorological instruments was published in 1730, and in 1737, Pieter le Clercq began his work on a Dutch translation of Abbé Pluche's multi-volume *Spectacle de la Nature*,<sup>86</sup> but it took until 1749 for a more complete French treatise on natural philosophy to be translated and published in Dutch. This was Noël Regnault's *Godvruchtige en proefkundige beschouwingen van de wetten en wer-*

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83. Willem Jacob 's-Gravesande, *Wiskundige Grondbeginselen der Natuurkunde, door Proef-ondervindingen gestaafd. Ofte Inleiding tot de Newtoniaansche Wysbegeerte*, vol. I [vol. II was intended, but never published] (Leiden, Johannes Arnoldus Langerak and Jan en Hermanus Verbeek, 1743). Cf. Cornelis de Pater, *Willem Jacob 's Gravesande* [!]: *welzijn, wijsbegeerte en wetenschap* (Baarn 1988), with bibliography.

84. Jan Engelman (1710-1782) published also a physico-theological treatise on snowflakes with the title *Het regt gebruik der natuurbeschouwingen, geschetst in eene verhandeling over de sneeuwfiguren* (Haarlem, Izaak van der Vinne, 1747). According to the title, this book was a paraphrase on Nieuwentyt's popular book *Het regt gebruik der wereldbeschouwingen* of 1715. See for him and his circle: Sliggers, 'Honderd jaar natuurkundige amateurs in Haarlem'.

85. That is: the 'Dutch Society of Sciences'.

86. Noël Pluche, *Schouwtooneel der natuur, of samenspraaken over de bysonderheden der natuurlyke histori, die men bequaamst geoordeeld om den jongen lieden leerzucht te boezemen, en hun verstand op te leiden*, 15 vols (The Hague, various publishers, 1737-1749; reissued in Amsterdam 1776, and again in 1799).

*ken der natuur* ('The Devout and experimental consideration of the laws and works of nature'), a book translated by an unknown 'lover of physics' and published by the Amsterdam book trader Steven van Esveldt.<sup>87</sup> In 1760, the book was enlarged with two additional volumes, composed of texts by other 'learned men', mostly written by 'the honorable Newton and of many members of the Society of Scholars in England; and of the Academy of Sciences in France'. Interestingly, the title page of these two extra volumes states that these additions were translated by 'a company of enthusiasts of physics and astronomy at the state university of Leiden'.<sup>88</sup> This group had also investigated the first volume by 'performing experiments, in order to find out the truth of it all'.<sup>89</sup> It is possible that this group comprised of interested students working under the direction of Professor Johan Lulofs, who is known to have held a 'Monday assembly' on a regular basis.<sup>90</sup> In the preface of the second volume, it is explained that these additions had been delayed for more than a decade as a result of the 'gentleman who had worked on the first volume' having spent a considerable period abroad.<sup>91</sup> The enterprise had been continued because experiments had brought to light several insights 'on which rarely had been published in the Dutch language'. Following Nieuwentyt's example, the present editors intended to use 'the present glorious

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87. Noël Regnault, *Godvruchtige, en proefkundige beschouwingen, van de wetten en werken der natuur, ter betooging van Gods almacht, wysheid en goedheid, uit de werken van veele beroemde mannen, en in 't byzonder uit de natuurkundige zamenspraaken van de geleerden vader Regnault, te zamen gestelt, opgeheldert, en tot verheerlyking van God, en overtuiging der Atheïsten, Deïsten en andere dwaalgeesten aangedrongen, door een liefhebber der natuurkunde* (Amsterdam, Steven van Esveldt, 1749). This volume consisted, for the most part, of a Dutch translation of Noël Regnault, *Les entretiens physiques d'Aristote et d'Eudoxe, ou Physique nouvelle en dialogues* (Paris 1729).

88. 'Een Gezelschap van eenige Liefhebbers der Natuur en Starrekunde, op 's Lands Hooge Schoole te Leiden' (1760).

89. That is: 'door proevnemingen getoetst, en de waarheid van alles nagespoord'. In volumes II and III, however, only very few experiments and observations are specified in a Dutch context. In vol. II (1760), p. 468, an experiment is described with a barometer, done at the 'byzonder Natuur- en Starrekundig College op 's Lands Academie te Leiden'; on p. 522, a new microscopic observation is described, and on p. 529, a reflecting telescope according to Newton's design is mentioned, owned by the 'vernuftige heer Stekhove, bloemist en landmeeter van Rhyndland', who had made a 'buis-verrekyker van Koper', an instrument which was 'wonderbaar'. This must have been one of the first reflecting telescopes built in the Netherlands.

90. Lulofs mentioned this 'Maandags gezelschap' in a letter to Klinkenberg, written on 4 May 1759, Harleem, Noord-Hollands Archief, Archive KNAW, inv. no. 31.

91. In Regnault, *Godvruchtige, en proefkundige beschouwingen*, vol. II (1760), p. 27-28, a long stay is mentioned at the Caribbean Isle of Curaçao where one of the editors had visited the slave-plantation 'Hato' owned by the local governor Faesch.

experimental physics'<sup>92</sup> to clarify the magnificence of God's creation. More precisely, they had selected several foreign scientific texts, especially on electricity, gravitation, optics and astronomy, which were translated from Latin, French, Italian, English and German.

Probably the most popular Dutch translations on experimental physics in the Netherlands were those of the works of the Frenchman Abbé Nollet. This itinerant practitioner had been inspired to study physics while on his travels to England and the Netherlands during the years 1734-1736. He had seen Desaguliers's performances in London and, like his compatriot, the great philosopher Voltaire, he had attended some lectures given by 's-Gravesande at Leiden University. While these lessons had inspired Voltaire to compose his well-known *Elements de la Philosophie de Neuton* [!] (Amsterdam 1736), they had aided Nollet in finding his vocation as a populariser of experimental physics. In his lessons, almost every phenomenon was explained by experiments or demonstrations, and hardly any mathematics was used. In France, Nollet amused many high-placed persons, including the French 'Dauphin' and the Crown Prince of Sardinia. Between the years 1743-1748, he published his six-volume *Leçons de Physique Expérimentale*, a collection that was reprinted several times during the eighteenth century.<sup>93</sup> The Dutch translation of these *Natuurkundige Lessen door Proefneemingen bevestigd* ('Physics lessons confirmed by experiments') was issued over the period 1759-1767 by the Amsterdam publisher Klaas van Tongerloo. This was a richly illustrated book, published in twelve small octavo volumes.<sup>94</sup> In 1772 the Utrecht publisher Samuel de Waal obtained the remaining stock of the translation. At that time he added an index volume, to be followed in the years 1773-1783 by Nollet's three-volume *Brieven over de elektrisiteit* ('Letters on electricity'), translated 'by the same translator of his lessons'.<sup>95</sup> Most likely this anonymous translator was Martinus Houttuyn who would sign his additional remarks in his various translations with the letter 'H'; pre-

92. That is: 'de hedendaagse zegenpralende proevkundige natuurkunde'.

93. Cf. Lewis Pyenson and Jean-Francis Gauvin, *The Art of teaching physics: the eighteenth century demonstration apparatus of Jean Antoine Nollet* (Quebec 2002).

94. Jean Antoine Nollet, *Natuurkundige Lessen, door Proefneemingen bevestigd, Tot opheldering van allerley dagelyks voorkomende Zaaken*, 6 vols in 12 bindings (Amsterdam, Klaas van Tongerloo, 1759-1768). See Pyenson and Gauvin, *The Art of teaching physics*, no. V-h.

95. That is: 'door den Vertaaler van Nollet's Natuurkundige Lessen'. Jean Antoine Nollet, *Brieven over de Elektrisiteit. Uit het Fransch vertaald, En met eenige Aantekeningen, en Byvoegsels, meest uit andere Werken, van den zelfden schryver, vermeerderd, door den Vertaaler van Nollet's Natuurkundige Lessen*, 3 vols (Utrecht, S. de Waal and Amsterdam, G. Warnars, 1773-1783). See Pyenson and Gauvin, *The Art of teaching physics*, no. XI-d.

sent in several footnotes in the Dutch edition of Nollet.<sup>96</sup> Compared with Nollet's original French edition, the Dutch edition was considerably enlarged, for instance with a section on windmills and an 'explanation of some phrases coined by mathematicians, which are used in this work'.<sup>97</sup> Besides, various cross-references to relevant literature in the Dutch language were added, including many references to the *Uitgezogte Verhandelingen*, the journal edited by Martinus Houttuyn. Van Tongerloo, who was a business companion of the publisher Frans Houttuyn, Martinus Houttuyn's cousin, dedicated the first volume to the Amsterdam professor Petrus Camper, who had lectured in experimental philosophy during his professorship at Franeker University.

The Dutch edition of Nollet's lessons became very popular in the Netherlands. The book was used in many of the local physics societies that emerged in the last decades of the eighteenth century, for instance in the 'Natuurkundig Genootschap der Dames' ('The Physics Society for Ladies') which was founded in 1785 in the city of Middelburg in the province of Zeeland.<sup>98</sup> In 1777, the series was complemented with a Dutch translation of Nollet's *L'Art des Expériences* (1768-1770), a series of three volumes devoted to a description of the instruments used in his lessons and containing all kinds of instructions on how to construct them. Strangely, this series was presented by a different publisher, the Amsterdam bookdealer Steven Jacobus Baalde. As no 'H' mark can be found in this series, this is likely the work of a different translator. This *Proef-ondervindelyke Natuurkunde ter ophelderinge der natuurkundige lessen en andere Natuurkundige werken door den heer abt Nollet* ('Experimental physics for the elucidation of the physics lessons and other works of physics by Abbé Nollet') is nowadays infrequently found in Dutch libraries, which could be an indication that this last series attracted fewer buyers.<sup>99</sup> In 1785, a final Nollet volume appeared, this time again by De

96. See for instance vol. I, part 1, p. 127-128; vol. III, part 2, p. 154; vol. IV, part 1, p. 105; and vol. VI, part 1, p. 121. Other footnotes containing remarks from a more recent French edition were marked 'Nollet' or 'N'. For Houttuyn's habit of marking his own pieces with an 'H', see Boeseman and De Ligny, *Martinus Houttuyn (1720-1798) and his contributions to the natural sciences*, p. 85 and p. 102.

97. 'Verklaaring van eenige meetkonstenaarsbeoordingen die in dit werk gebruikt zyn.' Cf. Nollet, vol. II, part 1, p. 337-450. For the 'Verklaaring van eenige meetkonstenaarsbeoordingen die in dit werk gebruikt zyn', see I.43-64.

98. Cf. Margareth Jacob and Dorothee Sturkenboom, 'A Women's scientific society in the West: the late eighteenth-century assimilation of science', *ISIS: an international review devoted to the history of science and its cultural influences* 94 (2003), p. 217-252 and Henricus A. M. Snelders, 'De beoefening van de natuurkunde door de goeude burgerij uit de achttiende eeuw', *Documentatieblad Werkgroep Achttiende Eeuw* 31/32 (1976), p. 3-24.

99. Jean Antoine Nollet, *Proef-ondervindelyke Natuurkunde ter ophelderinge der natuurkundige lessen en andere Natuurkundige werken door den heer abt Nollet*, [...] uit het Fransch

Waal, who re-issued one of Nollet's earliest works on electricity, a translation of his *Essai sur l'électricité des corps* (Paris 1746 and The Hague 1747). This booklet had already been translated into Dutch in 1748 by the Leiden professor in natural philosophy Jean Nicolas Sebastien Allamand, who had supplemented the book with a treatise on the possible nature of the attractive forces concerned.<sup>100</sup>

After Nollet, other popular books and translations on experimental physics were launched but no publication ever equalled Nollet's success. Dutch translations of famous books such as Leonhard Euler's *Lettres à une princesse d'Allemagne sur divers sujets de physique et de philosophie* (Petersburg 1768-1772), published in 1785-1786 in Utrecht as *Brieven over de voornaamste onderwerpen der natuurkunde en wysbegeerte* ('Letters concerning the major subjects of physics and philosophy'), or Francesco Algarotti's famous Italian tract *Il Newtonianisme per le Dame* (Milan 1737), published (probably) in Dordrecht in 1768 as *Newtoniaansche wysbegeerte voor vrouwen* ('Newtonian physics for ladies') are rarely to be found in modern Dutch libraries, suggesting, again, a rather modest circulation at the time of their release.<sup>101</sup>

## V. Conclusion

In the 1730s, a wave of popularisation of experimental philosophy swamped the Netherlands. Prepared by the physico-theological component of Newtonianism (which, in the 1720s, had replaced previous resistance towards the rational natural philosophy of radical Cartesianism), and stimulated by the appealing physics and astronomy lectures of the English itinerant showman John Theophilus Desaguliers, people from varied social backgrounds became

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*vertaald*, 3 vols (Amsterdam, Steven Jacobus Baalde, 1777). See also Baalde's prospectus (UB Amsterdam, KVB PPA 594:17) and Pyenson and Gauvin, *The Art of teaching physics*, no. XIV-d.

100. Jean Antoine Nollet, *Proeve omtrent de Electriciteit der Ligchaamen* (Utrecht, Samuel de Waal, 1784). See Pyenson and Gauvin, *The Art of teaching physics*, no. VI-f. The earlier translation by Jean Nicolas Sebastien Allamand had been issued with the title *Proeve over de aanlokkige-kracht der lighaamen. Met een verhandeling over de aanlokige-kracht door J. N. S. Allamand* (Leiden, E. Luzac, 1748) – not mentioned by Pyenson and Gauvin. For Allamand's role as a (French) translator and as a knowledge broker between writers and publishers, see Rietje van Vliet, 'Makelaar in intellect: Johannes Nicolaas Sebastiaan Allamand (1713-1787) als intermediair tussen schrijvers en uitgevers', *Tijdschrift voor sociale en economische geschiedenis* 1 (2004), p. 103-122.

101. The Dutch Central Catalogue (NCC) only mentions the second Dutch edition of Francesco Algarotti, *Newtoniaansche wysbegeerte voor vrouwen* (Amsterdam, Harmanus Keyzer and Utrecht, A. Stubbe, 1775).

interested in studying the subject, particularly its experimental aspect. This popularisation persisted throughout the eighteenth-century and triggered a demand for popular scientific literature, a great quantity of which consisted of Dutch translations of foreign publications, mostly from of English provenance but also originating from French, German and even Italian sources.

Remarkably, many of the early translators of this literature were related to dissident theological circles in the Netherlands. In particular, the wealthy Mennonite community contributed to the dissemination of natural science and experimental philosophy. In my survey of both known and speculated translators, as well as publishers in this field, I have encountered the Mennonites Ten Kate, Tirion, Van Loon, Centen, Houttuyn, Van Schagen, De Vrijer, Nettis, Bosch, and Ploos van Amstel, and the Remonstrants Krighout and Van den Bosch. A prolific translator like Jan Wagenaar can also be regarded as strongly influenced by his Mennonite friends. These results confirm the belief forwarded already by Kloek, Mijnhardt, and others that dissenters played a key role in the transmission and dissemination of new ideas.<sup>102</sup>

Many Dutch translators were linked in one way or another with a circle of physics enthusiasts. In Amsterdam, such groups existed around Tirion, Von Sprögel, (Martinus) Houttuyn and Bosma;<sup>103</sup> in Haarlem, translators like Bosch and Engelman were active within the same physics society; in Middelburg, Nettis was at the heart of such a group and De Vrijer was a member of a local physics society at Wormerveer. Thus it seems that in many cases a network of 'konstgenoten' ('fellows of the arts'), as they often referred to themselves, was a stimulus for undertaking a translation.

The content of most translations stayed close to the text of the original authors, reflecting one contemporaneous view, that 'a translator earns his distinction, when he [...] expresses in a faithful way and in a clear style the same things that the original author has said'.<sup>104</sup> The translator of Winkler's *Beginselen der Natuurkunde* (1768) even feared that he had stayed so close to the original (German) text, that in some cases a very skilled reader would

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102.Cf. Joost J. Kloek and Wijnandus W. Mijnhardt, 1800: *blauwdrukken voor een samenleving* (The Hague 2001), p. 79; translated into English by Beverley Jackson as *1800: blueprints for a national community* (Assen 2004).

103.The Amsterdam lecturer Jan van den Dam also had produced a translation of a work on astronomy and geography. See Isaac Watts, *Eerste beginselen der Sterre- en Aardrijkskunde. Op een duidelyke wyze voorgesteld door het gebruik van Globen en Kaarten. Na den derden Druk uit het Engelsch vertaalt. door Jan van den Dam. Met eenige bijvoegselen en veranderingen* (Amsterdam, Gerardus Lequien, 1749; 2<sup>nd</sup> ed. Jacobus Hafman, 1750).

104.'Een vertaler heeft zijn verdienste, als hij, bij de kennis der onderwerpen, de taal die hij overbrengt, en die waarin hij schrijft, wel verstaet; als hij getrouw vertaelt, en ons in een duidelijke stijl, hetzelfde zegt als de schrijver gezegd heeft.' Bakker, *Het leven van Jan Wagenaar*, p. 16.

judge his translation as presented in incorrect Dutch and still being too German.<sup>105</sup> However, in a few cases considerable additions and alterations were made, for instance by Houttuyn, who added large expansions with comments in some cases. Concerning the quality of the translations, not everybody was satisfied. Concerning Le Clercq's translations, for instance, it was said that these were 'quick rather than faithful'.<sup>106</sup> Not all translations were completed or printed; translations of books by 's-Gravesande or Joseph Priestley were never finished.<sup>107</sup> Likewise, a Dutch translation of the famous instrument manual by Nicolas Bion was never published.<sup>108</sup> The same applies to a Dutch translation of Lord Mahon's *Principles of Electricity* which was made in the 1780s for the Dutch patrician Van de Perre.<sup>109</sup>

In view of the Dutch translations on experimental philosophy in the Newtonian spirit, it can be stated overall that these presented to the Dutch public a good insight into the relevant popular literature published in broader Europe. As such, the translators and publishers contributed to the transmission, spread and use of foreign natural philosophy in the Netherlands. The physico-theological motive frequently appeared to be a key factor in translation and popularisation efforts. However, through this physico-theological message, the notion of the possibility of a manipulation of nature entered the minds of many enthusiasts of experimental physics. This evidently supported the notion of scientific knowledge as being of some practical significance to society, and, in its own right, this contributed to social acceptance of the methods of science in the Netherlands, where the emphasis on 'usefulness' would become a defining and persistent characteristic of an approach to natural science studies.<sup>110</sup>

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105. Winkler, *Beginselen der Natuurkunde*, preface.

106. That is: 'meer vlug als getrouw'. Bakker, *Het leven van Jan Wagenaar*, p. 54.

107. See note 83 and Joseph Priestley, *Proeven en Waarneemingen op verschillende soorten van Lucht*, 2 vols (Amsterdam, Pieter Hayman, 1778-1781). This translation was made by Jacob Ploos van Amstel Jacobsz (1735-1784), a Mennonite physician who had graduated from Leiden University in 1758. His father left lecture notes, made at the first lessons on experimental physics given by Fahrenheit. See note 15.

108. Nicolas Bion, *Verhandeling van de constructie in de voornaemste gebruiken der mathematische instrumenten* [...] in 't Nederduits overgezet door Jacob Grauwers, never published, manuscript in Museum Boerhaave, Leiden. The translator, Jacob Grauwers (\* Rotterdam [Dutch reformed] 1730), had studied mathematics at Leiden University (matriculation 1753). In 1757, he unsuccessfully applied for the position of lecturer of mathematics (left vacant by the death of his tutor W. La Bordus). His *Vertoog over het nut der wiskunde* ('Exposition of the usefulness of mathematics') is still in the archives of the Dutch Royal Family.

109. Huib J. Zuidervaart, 'Mr. Johan Adriaen van de Perre (1738-1790): portret van een Zeeuws regent, mecenas en liefhebber van nuttige wetenschappen', *Archief: mededelingen van het Koninklijk Zeeuwsch Genootschap der Wetenschappen* (1983), p. 1-169 (p. 104).

110. Bert Theunissen, '*Nut en nog een nut*': *wetenschapsbeelden van Nederlandse natuuronderzoekers, 1800-1900* (Hilversum 2000).