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Published by	
Ashgate Publishing Limited	Ashgate Publishing Company
Gower House	Suite 420
Croft Road	101 Cherry Street
Aldershot	Burlington, VT 05401-4405
Hants GU11 3HR	USA
England	

Ashgate website: <http://www.ashgate.com>

British Library Cataloguing in Publication Data

Curiosity and Wonder from the Renaissance to the Enlightenment

1. Curiosities and wonders – Europe – History. 2. Collectors and collecting – Europe – History. 3. Science – Europe – History. 4. Cabinets of curiosities. 5. Europe – Intellectual life – 16th century. 6. Europe – Intellectual life – 17th century. 7. Europe – Intellectual life – 18th century.

I. Evans, Robert John Weston. II. Marr, Alexander, 1978–

940.2

Library of Congress Cataloging-in-Publication Data

Curiosity and Wonder from the Renaissance to the Enlightenment / edited by R.J.W. Evans and Alexander Marr.

p. cm.

Includes bibliographical references.

ISBN 0-7546-4102-3 (alk. paper)

1. Renaissance – Miscellanea. 2. Enlightenment – Miscellanea. 3. Civilization, Modern – miscellanea. 4. History, Modern – Miscellanea. I. Evans, Robert John Weston. II. Marr, Alexander, 1978–

CB361.C87 2006

940.2'1–dc22

Reprinted 2007

ISBN-10: 0-7546-4102-3

ISBN-13: 978-0-7546-4102-5

Printed on acid-free paper

Typeset in Palatino by Jonathan Hoare, Pinner, Middlesex

Printed and bound in Great Britain by MPG Books Ltd, Bodmin, Cornwall

Med Lib  
Hist.  
CB361  
C87  
2006

## Back from wonderland: Jean Antoine Nollet's Italian tour (1749)

*Paola Bertucci*

In the eyes of foreign travellers, the Italian peninsula seemed like an enormous cabinet of curiosities in which *naturalia* and *artificialia* voluptuously offered themselves to both senses and intellect. Renaissance art, Etruscan, Greek and Roman ruins, natural landscapes and active volcanoes alternated in quick succession before the enraptured eyes of Grand Tour travellers. If wonder was the passion excited by the extraordinary, Italy was a country where extraordinary views and extraordinary customs so abounded that the whole peninsula seemed to be a wonderland. Nature, art and social customs each helped to take foreign visitors by surprise. In Italy, everything was wonderful, from Michelangelo's sculptures to the ruins of Ercolano, from Raphael's paintings to Farinelli's voice. From ambassadors, or Italian correspondents, foreign academies of science often received news of the 'curious' phenomena occurring in the peninsula, while popular magazines also contributed to the literary construction of Italy as wonderland. In the south, Mount Etna and Mount Vesuvius offered unpredictable, marvellous performances whose details, once published, entertained naturalists abroad, and inspired painters with visions of eruptions they had never seen. The operations of nature seemed to escape order almost as often as Italians themselves ignored the rules, tacit or explicit, of 'decorous' social behaviour. In the country of Casanova and Don Giovanni, the ladies too, dallying with their *cicisbeo* on public occasions, enjoyed a degree of liberty verging on libertinism.<sup>1</sup>

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I am grateful to Giuliano Pancaldi for attracting my attention to Nollet's unpublished travel diary. I wish to thank also Roger Hahn and John Heilbron who made the typescript of the diary available to me during the month I spent at the Office for the History of Science and Technology at Berkeley in 2004. For useful comments or suggestions I am grateful to: Laurence Brockliss, Marta Cavazza, Robert Evans, Paula Findlen, Oliver Hochadel, Stephen Johnston, Alex Marr, Mary Terrall.

<sup>1</sup> *Cicisbeo* was a (usually) Platonic lover of a married woman. Their relationship was public, not clandestine. On *cicisbeism*, see R. Bezzocchi, 'Cicisbei. La morale italiana', *Storica*, 9 (1997), 62–90.

And Italian women surprised foreign visitors in other ways. Whether thought of as monstrous or wonderful, a woman's affiliation to literary or scientific academies was by no means unknown. Since 1678, when the Venetian Elena Cornaro Piscopia was awarded a degree in philosophy from the University of Padua, several other Italian women had tried to make their way in the academic world. The news of a female graduate spread quickly, and attracted the attention of the media of the time. Regarded as 'wonders of their sex', the *dottresse* were celebrated in poems, paintings and various reports, arousing a deep interest in foreign travellers who made a point of visiting them.<sup>2</sup> Cornaro Piscopia's tomb in Padua was one of the recommended sights in Maximilien Misson's best-selling travel guide *Voyage d'Italie* (first edition: La Haye, 1691).<sup>3</sup>

Italy was also the country of miracles and prodigies of every kind. The kingdom of Naples, in particular, was a horn of plenty for them. In Naples Cathedral, San Gennaro's blood liquefied twice a year, while that of John the Baptist liquefied in the church of Santa Maria Donna Romita (again in Naples).<sup>4</sup> Frantic rhythmical dances released the *tarantolati* from uncontrolled convulsions in Apulia, while in the Grotta del Cane, near Agnano, a mysterious, mephitic gas silently killed any living creature breathing near the ground. In the volcanic area around Vesuvius, whose crater could be admired after a demanding climb, visitors could enjoy the Solfatara's boiling sand and, not far from there, a pit where water bubbled vigorously at lukewarm temperature. Italy's marvels were well known to Grand Tour travellers. Travel literature, word of mouth and academic reports mapped wonders and prodigies not to be missed during one's journey. They also constructed 'Italy' (which, *de facto*, was a collection of several states variously ruled) as one nation, and its inhabitants, the Italians, as lovers of superlatives, infatuated with their country beyond measure. 'We have already seen I do not know how many presumed eighth wonders of the world', wrote Misson from Vicenza, warning his readers about Italians' ambagious style.<sup>5</sup> Italy, in this kind of literature, was

<sup>2</sup> On the Italian 'filosofesse', see M. Cavazza, 'Les femmes à l'Académie: le cas de Bologne' in D.-O. Hurel and G. Laudin (eds), *Académies et Sociétés Savantes en Europe (1650-1800)* (Paris, 2000), 161-75; and 'Between Modesty and Spectacle: Women and Science in Eighteenth-Century Italy' in P. Findlen and C. M. Sama (eds), *Italy's Eighteenth Century: Gender and Culture in the Age of Grand Tour* (forthcoming); P. Findlen, 'Science as a Career in Enlightenment Italy: The Strategies of Laura Bassi', *Isis*, 84 (2000), 440-69; 'Translating the New Science: Women and the Circulation of Knowledge in Enlightenment Italy', *Configurations*, 2 (1995), 167-206; 'A Forgotten Newtonian: Women and Science in Italian Provinces' in W. Clark, J. Golinski, S. Schaffer (eds), *The Sciences in Enlightened Europe* (Chicago and London, 1999), 313-49; and 'Becoming a Scientist: Gender and Knowledge in Eighteenth-Century Italy', *Science in Context*, 16 (2003), 59-87.

<sup>3</sup> Maximilien Misson, *Voyage d'Italie*, 4 vols (5th edn, Utrecht, 1722), iii, 172.

<sup>4</sup> Misson, *Voyage*, iii, 34.

<sup>5</sup> Misson, *Voyage*, i, 171. 'Nous avons déjà veu je ne sçay [sic] combien de prétendûes huitièmes Merveilles du Monde.'

also homeland to credulity, superstition, beauty, charlatanism and a glorious past: a vast cabinet of curiosities to be visited following the itineraries of best-selling travel diaries, updated inventories of the wonders to be found in the open-air *Wunderkammern* south of the Alps.<sup>6</sup>

Jean Antoine Nollet (1700–1770) – at the time of his Italian tour a respected member of the Académie des Sciences in Paris, a fellow of the Royal Society of London, and a highly reputed experimental philosopher – imbibed this cultural stereotype both from his work at the Académie and from his citizenship of the Republic of Letters. But his attitude towards the abundance of ‘those marvels of nature and art ... that everybody knows, either for having seen them, or for having read books that talk about them’ was a sceptical one.<sup>7</sup> It was with the explicit intention to debunk what he sarcastically regarded as ‘miracles’ inexplicably reserved to Italian soil, that in 1749 he set out on his tour south of the Alps.<sup>8</sup> His Italian journey stands as an exception to what Lorraine Daston and Katherine Park argue in *Wonders and the Order of Nature*:

Enlightenment savants did not embark on anything like a thorough program to test empirically the strange facts collected so assiduously by their seventeenth-century predecessors or to offer natural explanations for them. ... Leading Enlightenment intellectuals did not so much debunk marvels as ignore them.<sup>9</sup>

Before and after his departure Nollet made of the Italian ‘love of the marvellous’ the target of a campaign. Following Nollet in his tour, I argue that his relationship with the culture of curiosity and wonder unfolded along a double register: on the one hand, he dallied with the contemporary rhetoric that associated the ‘love of the marvellous’ with plebeian credulity and superstition; on the other, his involvement in the business of wonders and natural curiosities (of which electrical experimental philosophy was a glowing example), and his status as an expert in the field, facilitated his admission to those élitist microcosms, the numerous courts south of the Alps. His whole career gravitated around wonder and curiosity. Whether with a complacent or a belligerent attitude, he knew very well that in the process of moulding one’s career as a natural philosopher, wonders could not be ignored.

<sup>6</sup> On the Italian Grand Tour, see A. Wilton and I. Bignamini (eds), *Grand Tour. Il fascino dell’Italia nel XVIII secolo* (Milan, 1997); C. De Seta, ‘L’Italia nello specchio del Grand Tour’ in *Storia d’Italia, Annali V: il paesaggio* (Turin, 1982); G. Mercenaro and P. Boragina (eds), *Viaggio in Italia. Un corteo magico dal Cinquecento al Novecento* (Milan, 2001).

<sup>7</sup> J. A. Nollet, ‘Expériences et observations en différens endroits d’Italie’ in *Mémoires de l’Académie des Sciences de Paris* (1749), 444–88 at 444.

<sup>8</sup> P. Bertucci, ‘Sparking Controversy: Jean Antoine Nollet and Medical Electricity South of the Alps’, *Nuncius*, 20 (2005), 153–87. I. Benguigui, *Théories électriques du XVIIIe siècle. Correspondence entre l’abbé Nollet (1700–1770) et le physicien genevois Jean Jallabert (1712–1768)* (Geneva, 1984), 167.

<sup>9</sup> L. Daston and K. Park, *Wonders and the Order of Nature, 1150–1750* (New York, 2001), ch. 8.

### The wonderful career of the abbé Nollet

[l'abbé Nollet] me mande qu'on ne voit à sa porte que des carrosses de duchesses, de pairs et de jolie femmes. Voilà donc la bonne philosophie qui va faire fortune à Paris. Dieu veuille que cela dure!<sup>10</sup>

The career of Jean Antoine Nollet in the world of experimental philosophy was a startling one. A theology graduate from the University of Paris in 1724, he was never ordained, though he always retained the honorific title of 'abbé'. In the course of a few decades, he metamorphosed himself into a maker of philosophical instruments, a skilled designer of experiments, a charming public lecturer and demonstrator, a tutor to aristocratic families, an authoritative author of natural philosophical texts, and a respected member of the Académie des Sciences. From the beginning of his working life, everywhere he went, Nollet was particularly able to identify what could help him enhance his credentials and achieve higher social status. With the same careful dexterity that he employed in the making of his fine instruments, he meticulously carved out a career for himself that upgraded his status from that of an artisan to that of a celebrated natural philosopher who, being the tutor to the Dauphin de France, resided at Versailles.

Nollet entered the world of philosophical instrument-making with the aim of seeking patronage. As early as 1728 he dedicated a pair of globes to the Duchess of Maine, the aunt of the Comte de Condé, who provided patronage to the Société des Arts. This was a corporation of craftsmen, savants and artists, and attending it gave Nollet (elected a member in the same year) the opportunity to circulate amongst important people in both the business world and that of natural philosophy.<sup>11</sup>

With their black varnish, shining brass, red finish and oriental-like golden flowers, Nollet's instruments were well suited to the rococo rooms of the French aristocracy. Artificial eyes, microscopes and telescopes, together with water, vacuum, lifting, combustion and compression pumps, as well as electrical machines and magic lanterns, all captivated the imagination of his spectators by artificially recreating the natural world. The artificial eye, an instrument he made to show how images are formed on the retina, and to simulate the effects of myopia and farsightedness, helped them understand the mysteries

<sup>10</sup> Emile du Châtelet to Algarotti, 20 May (no year given, though I believe it dates from 1736), in F. Algarotti, *Opere*, 17 vols (Venice, 1794), i, 16.

<sup>11</sup> On Nollet's movements in the world of craftsmanship and the *Société des Arts*, see A. Turner, 'Sciences, Arts and Improvement: Jean Antoine Nollet, from Craftsman to Savant' in L. Pyenson and J.-F. Gauvin (eds), *The Art of Teaching Physics: The Eighteenth-Century Demonstration Apparatus of Jean Antoine Nollet* (Sillery, QC, 2002), 29–46.

of correct and poor vision, whereas elegant philosophical machines, operated by servants who turned their big wooden wheels, displayed the effects of centrifugal forces or the mysterious, livid light of 'electric fire'. A cabinet of his instruments enclosed the immense powers of nature in a cupboard, giving the owner the powerful feeling of 'possessing nature' that paralleled that of Renaissance collectors of wonderful and monstrous rarities.<sup>12</sup> On the shelves of their cabinets, however, the philosophical instruments embodied experimental philosophy's new, manipulative approach to the natural world. Through them, experimental demonstrators and their spectators could not only glimpse the mechanisms of nature, they could also force nature to display its hidden properties or powers. Philosophical instruments created artificial situations in which experimenters, boldly erasing the border between art and nature, could formulate questions and find the answers. Compression pumps were tools to investigate the effects of the density of air on the propagation of sound; air pumps showed that lack of air made birds and little animals suffocate; and electrical machines forced the pervasive, but often invisible, 'electric fire' to manifest itself. The artificial reconstruction of nature through philosophical instruments was irresistible for the curiosity of the upper classes, and experimental demonstrators, like Nollet, built their fortunes upon it.<sup>13</sup>

By the first half of the 1730s Nollet was already a name. In 1733 he became Réaumur's assistant at the Académie des Sciences, and five years later, after travelling to Holland and England, where he met the most important experimental demonstrators of his time, he replaced Buffon as *adjoint-mechanicien* for the Académie. In 1744 he became tutor to the Dauphin de France and moved to Versailles. Meanwhile, his atelier of philosophical instruments achieved international renown: whole cabinets of instruments were bought by courts, universities, academies and individuals all over Europe. At a time when natural philosophy was highly profitable, Nollet made a business out of the upper classes' demand for entertainment and novelty. Voltaire bought a physics cabinet worth 10,000 *livres* from him, and the instruments he sold at Versailles brought in so much money that he could not help boasting of it to his friend and correspondent Jean Jallabert.<sup>14</sup>

<sup>12</sup> On which, see P. Findlen, *Possessing Nature: Museums, Collecting and Scientific Culture in Early Modern Italy* (Berkeley, 1994).

<sup>13</sup> See S. Schaffer, 'Natural philosophy and public spectacle in the eighteenth century', *History of Science*, 21 (1983), 1–43; L. Stewart, *The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660–1750* (Cambridge, 1992); G. Sutton, *Science for a Polite Society* (Boulder, 1995).

<sup>14</sup> There is no biography of Nollet, with the exception of the inaccurate *L'abbé Nollet. Un physicien au siècle des Lumières* by J. Torlais (Paris, 1954). On Nollet's earlier activities as an instrument-maker, see J.-F. Gauvin, 'Eighteenth-Century Entrepreneur: Excerpts from the Correspondence between Jean Antoine Nollet, Etienne-François Dutour, and Jean Jallabert, 1739–1768' in Pyenson and Gauvin, *The Art of Teaching Physics*. See also Turner, 'Sciences, Arts and Improvement'.

His popularity as a demonstrator of experiments and as a fashionable tutor spread all over Europe, and as early as 1739 the King of Piedmont invited him to take up residence at the Royal Palace in Turin to look after the prince's education. During the six months of his stay, Nollet was busy networking with the professors of the University, who ordered a whole cabinet of his physics instruments, paid for by the King.<sup>15</sup>

Nollet's interest in electrical experiments dated back to the early 1740s. The 'science of wonders', as electricity was commonly referred to during the eighteenth century, identified a field of experimental research that was still largely unexplored and that could be highly spectacular. His repertoire of electrical experiments was outstanding, and employed the most recent discoveries in the field. Conscious of the fact that experimental demonstrations, with a few adjustments, could easily be transformed into marvellous performances, Nollet used the Leyden jar, a sort of cylindrical capacitor recently introduced in electrical experiments, to make hundreds of soldiers – holding hands – jump simultaneously as they experienced the electric shock it generated. Their surprised reaction, in the royal gardens of Versailles, guaranteed the King's amusement and his praise of Nollet. Similarly, the sudden appearance of livid electric sparks in darkened salons was variously exploited by public experimenters, who engineered demonstrations on an increasingly spectacular scale (Fig. 10.1). Writing his first essay on the subject in 1746, Nollet was certainly aware that electricity was 'the most fashionable branch of Physics' and that not only did it 'attract the attention of the experts, it also attracts ... amateurs of all conditions'.<sup>16</sup> Furthermore, the sexual allusions implicit in electric and magnetic experiments well suited the tastes of the *beau-monde*, as exemplified in the anonymous poem *The Semi-Globes, or Electrical Orbs*:

Each charm, by turns, reveal'd, must fuel prove,  
To feed the gentle, lambent flame of love,  
But most the beauties of the Bosom please,  
Nor any female charm can vie with these!  
The tempting seat of all that's sweet and fair,  
For Nature's Electricity is there!<sup>17</sup>

Electricity provided valuable opportunities to find one's way in the learned world of the Republic of Letters, and to consolidate (or start up) one's business

<sup>15</sup> Museo di Fisica dell'Università, Turin. *Catalogo del gabinetto di fisica* (MSS). I am grateful to Marco Ciardi who gave me a copy of the catalogue.

<sup>16</sup> *Journal des Trévoux*, IV (1746), 2074. '[L'électricité] est la partie de Physique le plus à la mode aujourd'hui. Elle fixe l'attention, non seulement des gens du métier, mais même de ceux qu'on peut nommer le vulgaire en fait de Sciences, elle trouve des amateurs dans toutes les conditions.'

<sup>17</sup> [anonymous], *The Semi-Globes, or Electrical Orbs. A Poem* (London, 1787), 4. On eighteenth-century magnetism, see P. Fara, *Sympathetic Attractions: Magnetic Practices, Beliefs and Symbolism in Eighteenth-Century England* (Princeton, 1996).



10.1 Nollet performing the 'flying boy' experiment. From Jean Antoine Nollet, *Essai sur l'électricité des corps* (Paris, 1746). Reproduced by kind permission of the Bakken Museum and Library for Electricity in Life, Minneapolis.



as a public demonstrator or instrument-maker. Nollet moved successfully between the two worlds with consummate ease. His project of replicating and ordering all the electrical experiments under his own personal supervision was endorsed by the Académie des Sciences,<sup>18</sup> while his *système Nollet* (a vaguely Cartesian-inspired, comprehensive explanation of the nature and role of 'electric fire' in the natural world) was accepted by most of his contemporaries and established him as the most authoritative electrician of the time.<sup>19</sup>

### Nollet in wonderland

Nollet started to plan his Italian tour in early 1749, prompted by his repeated failure to replicate the experiments carried out by a number of Italian electricians who claimed that electricity could be employed to perform instantaneous cures. The experiments were wonderful indeed. Sealed glass tubes, filled with perfumed substances, when rubbed on their outer surface, became in the hands of the Italians as permeable as sponges. The electric vapours excited by the rubbing made the perfumed particles evaporate through the pores of the glass into the spectators' nostrils. If medicaments were put inside the tubes, patients would be instantaneously cured simply by breathing the electric effluvia. Nollet's failure to replicate the effects described by the Italians prompted him to see the experiments for himself. The French court funded the journey in exchange for secret information on the manufacture of silk in Piedmont and other provinces south of the Alps, which Nollet solicitously provided.<sup>20</sup>

Nollet left Paris on 27 April 1749. The itinerary of his journey in the Italian peninsula included the most important capitals of Italian culture, past and

<sup>18</sup> Archives de l'Académie des Sciences, Paris, *Procès Verbaux*, 67 (1748), 486<sup>r</sup>-487<sup>r</sup>.

<sup>19</sup> J. A. Nollet, *Essai sur l'électricité des corps* (Paris, 1746). On Nollet's system of electricity, see J. Heilbron, *Electricity in the 17th and 18th Century: A Study of Early Modern Physics* (London, 1979), 280-89.

<sup>20</sup> I am currently completing a book on these aspects of Nollet's journey to Italy: *Viaggio nel paese delle meraviglie. Scienze e curiosità nell'Italia del Settecento* (forthcoming). On the medical experiments see Bertucci, 'Sparking Controversy'; 'The Electrical Body of Knowledge: Philosophy and Medical Electricity in the Mid-Eighteenth Century' in P. Bertucci and G. Pancaldi (eds), *Electric Bodies*, 43-68. It was Grandjean de Fouchy (president of the Académie), in his 'Eloge de M. L'Abbé Nollet', published in *Histoire de l'Académie* (1770, 121-36), who stated that the French Court had sent Nollet to Italy in order to gather information on the manufacture of silk. Also in the anonymous 'Precis de la vie et des travaux de M. Nollet, diacre, licencié en théologie de la Faculté de Paris, de l'académie royale des sciences, anonyme', in the *Journal des Trévoux* (1770), at 162, we read: 'Au mois d'avril 1749 la cour l'envoya en Italie pour prendre des connaissances concernant les manufactures des soies.' A quick reference to Nollet's interest in Piedmontese silk manufactories is in C. Poni, 'Standards, Trust and Civil Discourse: Measuring the Thickness and Quality of Silk Thread', *History of Technology*, 23 (2001), 1-16.

present. Starting from Turin, he travelled to Milan and from there to Venice, via Vicenza, Padua and Verona, then south to Bologna, Florence, Rome and Naples. On his way back from Bologna he went to Genoa via Pisa and Livorno and then headed north to Turin. Although the 'wonderful' electrical experiments mentioned above were, admittedly, the main reasons for him crossing the Alps, they were not the only ones. As his unpublished travel diary and the articles he published in the *Mémoires* of the Académie des Sciences show, the study of medical electricity was only one of his many activities during his nine-month stay. Self-promotion in Italian courts and in the academic world was for him a much more urgent concern. Taking notes of all he saw and of all the people he met, he mapped in his travel diary the content of Italian culture, and where it was to be found. He located private libraries, collections of ancient books and manuscripts, coins and medals, philosophical instruments and rarities of all kinds, which still retained their value both in financial terms and as attractions for prestigious visitors.

Everywhere he was received as a celebrity. He was already well known throughout Europe as the author of popular texts on experimental philosophy and as a fine inventor and designer of philosophical instruments. At the same time, the social context within which he carried out his work (the French court and the Académie des Sciences) enhanced the reputation he had gained by means of instrument-making and authorship. His frequentation of Versailles, in particular, roused the curiosity of aristocrats south of the Alps and opened the doors of exclusive *palazzi*. While visiting the various Italian states, he met French ambassadors, dined with counts and countesses, was received by princes and princesses, talked to cardinals and professors, was invited as a spectator to the King's *baisemain* in Naples, and had a private audience with the Pope. When he arrived in Bologna, the vice legate arranged for him to have a coach and a *laquais de place*, a welcome repeated in various other towns.<sup>21</sup> His conversation responded perfectly to the expectations of his hosts and hostesses. Natural philosophy was the talk of the day and the new areas of electricity and magnetism were irresistibly attractive to amateurs and philosophers alike. His abilities as an entertaining demonstrator and a skilled educator added to his appeal. For the wealthy amateurs that collected the symbols of natural philosophy, he was the authority who could give an expert evaluation – both in financial and philosophical terms – of their sometimes whimsical purchases. Upon receiving the big magnets he had ordered from England, the King of Piedmont invited Nollet to Court to get his opinion on their value, and a few days later he asked him to build a barometer for his cabinet.<sup>22</sup>

<sup>21</sup> Bibliothèque Municipale de Soisson, Soisson, MS 150: Jean Antoine Nollet, *Journal du voyage de Piémont et d'Italie en 1749*, 110<sup>r</sup>.

<sup>22</sup> Nollet, *Journal*, 58<sup>r</sup> and 76<sup>r</sup>.

Expertise was an advantageous element for Nollet's business as a philosophical instrument-maker: several amateurs ordered instruments from his Paris workshop, aware that their cabinets would thus acquire a new icon to their enlightened interest in natural philosophy. Their orders were not dictated by specific research agendas, as was the case with the orders placed by universities or academies: an instrument from Nollet's workshop would be a souvenir of their encounter with one of the most highly reputed authorities in natural philosophy. The prince of Tarsia did not even formulate specific requests when he asked Nollet to choose all the instruments appropriate to the completion of his collection, whereas the Cardinal Passionei ordered only a microscope, and left to Nollet the choice between a thermometer or a barometer. Similarly, the marquis of Oncieux entrusted Nollet with the choice of a good microscope from Paris.<sup>23</sup>

To the Italians, Nollet was a curiosity to be admired and contended for. His success was largely due to the fascination he exerted as the tutor to the Dauphin de France. The texts of his lectures to the young prince made up his six-volume *Leçons de Physique*, which thrilled readers with the idea they could receive the same education as the son of the French King. And Italian publishers knew that Nollet's books could be best-sellers even south of the Alps. On meeting him in Venice, the successful publisher Pasquali, who printed the Italian translation of the first three volumes of the *Leçons des Physique*, told Nollet of his plans to publish the Italian version of his latest work, *Recherches sur les causes particulières des phénomènes électriques* (Paris, 1749), urging him to send the volume in French. He also commissioned a number of copies of Nollet's previous works on electricity, to be sold in Italy.<sup>24</sup>

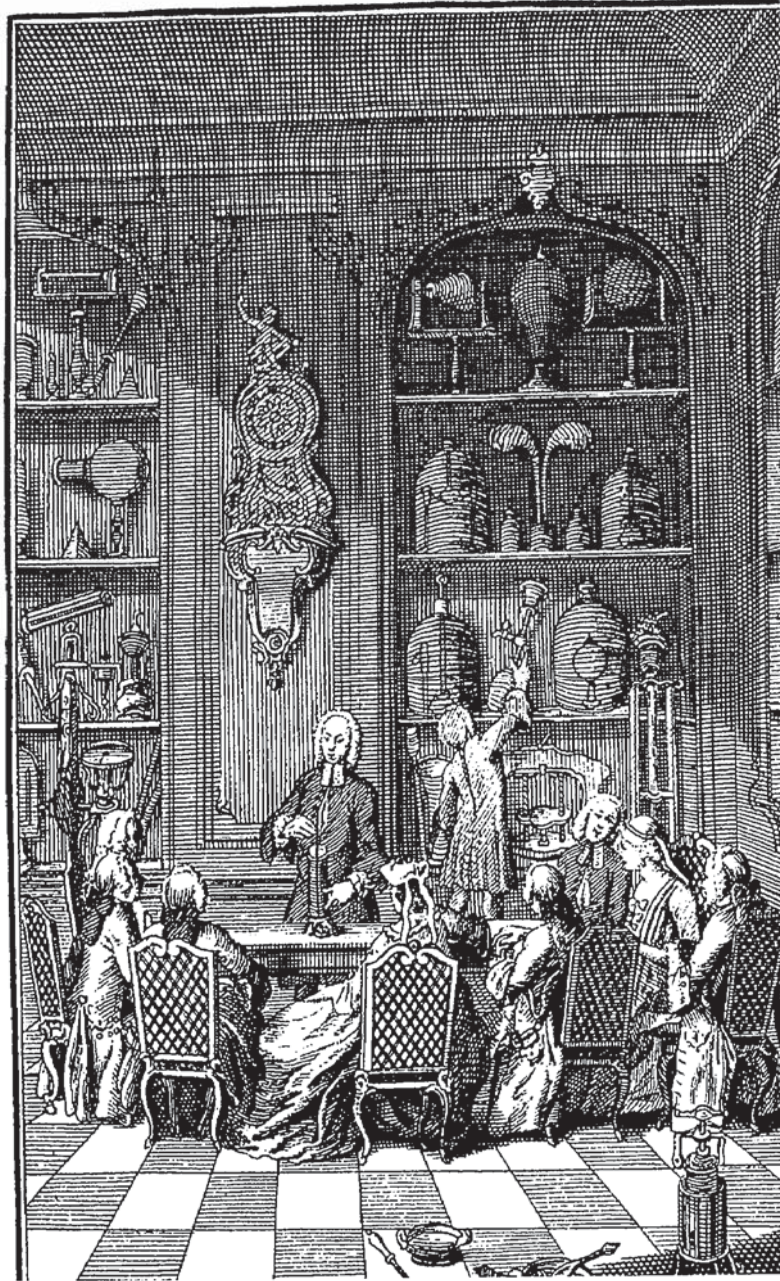
For those who were already familiar with Nollet's work, his presence added the unique experience of listening to his voice and seeing him perform to the ritual of reading out his lectures (Fig. 10.2). In Turin, he could rely on his own instruments, the ones that the University had bought from him ten years earlier. He employed them during his lectures to the young princesses, who appreciated his work so much as to require repeats. Nollet introduced them to his theories of electricity, passing entire days showing them its wonders. In private, however, he complained about the amount of time this took up.<sup>25</sup> The King of Piedmont himself was so fascinated by Nollet's lectures that on 13 June, while performing and lecturing for the Duke of Savoy, he asked the Duke if he could also attend the lectures.<sup>26</sup> Nollet's teaching style made him a tutor much in demand. When news spread that the famous French philosopher was in Italy, the Austrian ambassador in Naples, on behalf of the Empress,

<sup>23</sup> Nollet, *Journal*, 177', 194' and 212'.

<sup>24</sup> Nollet, *Journal*, 95'.

<sup>25</sup> Nollet, *Journal*, 69'.

<sup>26</sup> Nollet, *Journal*, 39'.



10.2 Nollet lecturing on experimental philosophy for an aristocratic audience. From Jean Antoine Nollet, *Leçons de physique expérimentale*, vol. 1 (Amsterdam, 1754). Reproduced by kind permission of the Bakken Museum and Library for Electricity in Life, Minneapolis.

insistently offered him a permanent position at the Viennese Court, an offer Nollet gently, but firmly, declined.<sup>27</sup>

From Turin to Naples, Nollet's arrival was an event that aroused great expectations. In the conversational context of experimental philosophy, the gatherings in aristocratic *salotti* were important occasions for social networking and self-promotion. So, while promising the duchess of Caserta to hand on her regards to the Marquise du Châtelet, Nollet electrified her with his accounts of his recent experiments and discoveries. She was so enthusiastic as to request all his latest works.<sup>28</sup> Nollet took special pleasure in female interest in experimental physics:

how glorious, my dear friend, for physics to have conquered the beautiful sex ... lately I received the visit of that female philosopher, ha! my friend, that physics has some graces when it is well coiffured!<sup>29</sup>

He also knew how to turn personal success into business opportunities. In Venice as well as Rome and Naples, after passing pleasant summer nights talking philosophy with him, the ladies of the aristocracy craved to have his books on their shelves. Meticulously, Nollet took note of their requests.<sup>30</sup>

Nollet's experimental style, blending natural philosophy with spectacle, was looked upon with much interest also by Italian professors seeking local patronage. Many an academician took advantage of his presence to ask his advice on how to please the tastes of their various audiences. In Naples, the physics professor Giovanni Maria La Torre, who had been recently appointed a demonstrator of experiments for Neapolitan princely youth, sought his collaboration in order to give his lectures the charming touch that characterised those of the abbé. In Rome, Père Jaquier, professor at the University La Sapienza, asked Nollet's opinion on which experiments to perform during a public demonstration, whereas Père Carlo Noceti wanted to be instructed in Nollet's electrical theories, so as to include them in the Latin poem on electricity that he intended to write.<sup>31</sup>

If the aristocracy received him as a curiosity not to be missed, in the cultural capitals Nollet made sure he visited those local celebrities whose fame had already been celebrated by previous French visitors, such as Charles-Louis de Secondat, Baron of Montesquieu, and Charles De Brosses, president of the parliament of Dijon: the learned women, the 'wonders of their sex'. In Milan, he was welcomed at the house of Signor Agnesi, whose daughter, Maria

<sup>27</sup> Nollet, *Journal*, 212'.

<sup>28</sup> Nollet, *Journal*, 159'.

<sup>29</sup> Benguigui, *Théories électriques du XVIIIe siècle*, 101 (Nollet to Jallabert, 4 December 1740) '... quelle gloire, mon cher amy, pour la physique d'avoir conquis le beau sexe, ... j'ay receu dernièrement la visite de ce philosophe feméle, ha ! mon amy, que la physique a de grâces quand elle est bien coiffée!'

<sup>30</sup> Nollet, *Journal*, 99' and 152'.

<sup>31</sup> Nollet, *Journal*, 157' and 143'.

Gaetana, had achieved fame at the age of seventeen thanks to her ability to discuss mathematical analysis. The philosophical soirées at Signor Agnesi's were embellished by the performances of Maria Gaetana's sister, who played the piano while her elder sister dealt with a subject chosen by one of the visitors.<sup>32</sup> The pattern of the literary salon with a female prodigy repeated itself elsewhere, with differences that were due in large measure to the different patronage system that sustained the local 'wonder of her sex'. Nollet could boast of having interacted with the most famous of them while in Italy. In the French-ruled Kingdom of Naples, he met Maria Angela Ardinghelli, a young girl who had just translated Stephen Hales's *Vegetable Staticks* into Italian. Nollet was impressed by Ardinghelli. He described her as a 'very virtuous young person, who in a very short time has greatly progressed in the sciences',<sup>33</sup> and promised to send her his works on electricity from Paris.<sup>34</sup> In Ardinghelli's *salotto*, philosophers discussed and even exchanged their works: Professor Della Torre presented Nollet with his books on experimental physics, whereas Ardinghelli gave him two mathematical problems for Clairaut. A few years later, Nollet wanted to highlight his intellectual encounter with the young Neapolitan lady, dedicating the first of his *Lettres sur l'électricité* to her (Paris, 1753). Another of the six letters was dedicated to Laura Bassi, professor of philosophy at the University of Bologna and a salaried member of the local Institute of Sciences. When in Bologna, Nollet (himself a member of the Institute of Sciences) met the professor and her husband Giuseppe Veratti, one of the electricians whose experiments Nollet had been unable to replicate. They invited him to their home where they discussed electricity, though no replication of the experiments took place. Notwithstanding their disagreement, Nollet started a correspondence with Laura Bassi that was to last over two decades.<sup>35</sup>

### Natural curiosities and Nollet's experimental philosophy

On Nollet's departure from Naples, the King asked him to send his regards to the royal family in Paris and declared that he was 'very happy to see you

<sup>32</sup> On Maria Gaetana Agnesi, see M. Cavazza, 'Between Modesty and Spectacle'; M. Mazzotti, 'Maria Gaetana Agnesi: Mathematics and the Making of the Catholic Enlightenment', *Isis*, 92 (2001), 657–83.

<sup>33</sup> J. A. Nollet, *Lettres sur l'électricité* (Paris, 1753), 6n: 'jeune personne très vertueuse qui a fait en peu temps des grands progrès dans les sciences.'

<sup>34</sup> Nollet, *Journal*, 194'. On Ardinghelli, see Findlen, 'Translating the New Science'.

<sup>35</sup> See G. Cenerelli, *Lettere inedite alla celebre Laura Bassi scritte da illustri Italiani e Stranieri* (Bologna, 1885), 95–102; also M. Cavazza, 'Laura Bassi e il suo Gabinetto di Fisica Sperimentale: realtà e mito', *Nuncius*, 10 (1995), 715–53. On the Institute of Sciences of Bologna see M. Cavazza, *Settecento Inquieto* (Bologna, 1990); A. Angelini and W. Tega (eds), *Anatomie Accademiche*, 3 vols, iii: *L'Istituto delle Scienze e l'Accademia* (Bologna, 1987).

here, I hear you have found many natural curiosities.<sup>36</sup> As the King had remarked, Italian natural curiosities could not miss striking even the sceptical Nollet. In line with the pattern established by other French travellers, and almost following in the footsteps of Misson's ideal pilgrimage through Italian wonders, Nollet stopped off at the sites of celebrated marvellous phenomena. He was accompanied by local philosophers who shared his interests and enabled him to perform experiments. In his travel diary he noted that the Venetian Laguna glittered 'in a marvellous way [*d'une manière merveilleuse*]' when 'gondoliers stroke its waters with their paddles', and he was also impressed by some luminous insects, commonly called *luciole*, that offered 'a very beautiful spectacle' on early summer nights, when hundreds of them gleamed intermittently like sparkling stars.<sup>37</sup> Their light was so bright that five or six inside a glass jar sufficed to 'distinguish easily the objects in my room during the night'.<sup>38</sup>

Each town held a surprise for Nollet's philosophical eyes, and in some cases, taste. The colourful Roman streets, for example, were overflowing with pieces of watermelon, a fruit that Nollet had never seen. If the 'beautiful colour that [it] offers to the eye' pleased his sight, Nollet was disappointed when he eventually took a bite, and found it 'tasteless'.<sup>39</sup> It was around Naples, however, that, 'Nature [was] even more admirable and instructive'.<sup>40</sup> Mount Vesuvius, with all the attention it received in travellers' and naturalists' reports, had duly raised Nollet's expectations. As he explained to his fellow-members of the Académie des Sciences, before his Italian tour his knowledge of volcanic eruptions had depended entirely on travellers' accounts. Their descriptions were so 'imperfect' as to make him impatient to see the volcano with his own eyes, and therefore 'to be able to reason about the facts with some confidence'.<sup>41</sup> Once there, he measured the volcano's height with a barometer, following Cassini's and Maraldi's method, and when the locals refused to

<sup>36</sup> Nollet, *Journal*, 190<sup>r</sup> (underlined in the original) 'je suis fort aise de vous voir icy, on dit que vous y trouvez beaucoup de curiosités naturelles, Je vous prie d'asseurer Le Roy e toute la famille royale de mon respect et de mon amitié.'

<sup>37</sup> Nollet, *Journal*, 105<sup>r</sup> and 46<sup>r</sup>. Nollet's use of 'merveilleux' or 'merveilleuse' with reference to natural phenomena is sparse, however the terms do appear in his published and unpublished texts. Italian translators rendered the French 'admirable', 'extraordinaire' and, of course, 'merveilleux', with the Italian 'maraviglioso'. Compare, for example, J. A. Nollet, *Recherches sur les causes particulières des phénomènes électriques* (Paris, 1749), xxi, xxvii, with id., *Ricerche sopra le cause particolari dei fenomeni elettrici* (Venezia, 1750), 8, 11. See also N. Kenny, *Curiosity in Early Modern Europe: Word Histories* (Wiesbaden, 1998), ch. 5: 'Neighbours of Curiosity in Early Modern Discourse', 106–88.

<sup>38</sup> Nollet, *Journal*, 46<sup>r</sup>.

<sup>39</sup> Nollet, *Journal*, 149<sup>r</sup>.

<sup>40</sup> Nollet, 'Suite des expériences et observations en différents endroits d'Italie', *Mémoires de l'Académie des Sciences de Paris* (1750), 54–106 at 67.

<sup>41</sup> Nollet, 'Suite des expériences', 79–80 'j'avois encore besoin de voir par moi-même, pour être en état de raisonner sur les faits avec quelque confiance.'

let him climb down into the crater, he contented himself with looking at the streams of lava and with the examination of the vapours exhaling all around.

Back in Paris, Nollet had collected enough dispelled wonders to engage the members of the Académie des Sciences in several meetings over the course of a year and to fill a total of ninety-eight pages in two volumes of the *Mémoires* of the Académie Royale des Sciences.<sup>42</sup> His tour consolidated both his authority in the Republic of Letters and his income as an author and instrument-dealer. Not only did Italian amateurs and savants commission his books and instruments, after the journey he was also offered a teaching position at the University of Paris: in 1753, the King appointed him professor of experimental physics at the Collège de Navarre. At the end of his journey, Nollet found seven new foreign correspondents from the Italian peninsula for the Académie (among whom the secretary of the Institute of Sciences, Francesco Maria Zanotti, and the professor of Physics at Turin, Giambattista Beccaria) and arranged for the *Mémoires* to be received systematically by a number of academic libraries.

Nollet's journey was simultaneously a self-promoting tour to build up connections with the aristocratic and academic worlds south of the Alps, and fieldwork in which the protocols of experimental philosophy were exported to the sites of supposedly marvellous phenomena. Nollet admitted that he had had to divide his Italian days (in particular those spent in Naples) between his own research and the obligations of *bienséance*,<sup>43</sup> or in other words, between social networking with the local experts and amateurs, and the gathering of information that would respond to the expectations of the Académie's members. In both contexts, the culture of wonder and curiosity played a significant role, though it was played upon with different strategies. If in the former context, as we have already seen, Nollet relied on the wonders of experimental philosophy to catch the attention of the aristocracy (and in part also of the intellectual élite), in the latter, his battle against the marvellous was predicated upon the erasure of the border between the natural and the artificial. His descriptions of the experiments he had carried out at the sites of celebrated 'natural curiosities' showed that the instruments and procedures of experimental philosophy had universal value; they did not partake of the local or unique nature that characterised accounts of the marvellous.

If the glittering laguna dazzled him just like other travellers, he did not allow his own personal amazement the final word. One night, when the phenomenon was particularly striking, he asked a servant to place a sample of the water in a glass vessel in order to study the conditions under which the luminescence manifested itself. Once in his room, Nollet examined the water by candlelight and noticed some thin seaweed that, when touched, produced luminous

<sup>42</sup> Archives de l'Académie des Sciences, Paris, *Procès Verbaux*, 69 (1750) and 70 (1751).

<sup>43</sup> Nollet, 'Suite des expériences', 67.





10.3 The Grotta del Cane, near Naples. From Maximilien Misson, *Voyage d'Italie* (Utrecht, 1722). Reproduced by kind permission of the Library of the University of Bologna.

spots. The similarity with *luciole* made him think that the phenomenon might be caused by a small insect and, upon observing the seaweed more closely, he indeed noticed a small animal that, when touched, emitted light.<sup>44</sup> Later in the course of his journey, he discovered that a Bolognese physician, Vianelli, had already identified in the small insect the cause of the phenomenon, but he only mentioned Vianelli's work in a footnote to his article for the *Mémoires*. The fact that Vianelli had already written about the insect gave more substance to his argument: while conceding the former's originality, he added a witness, and therefore authority, to his own testimony.

Even more detailed was Nollet's description of the experiments he carried out at the Grotta del Cane, near Naples (Fig. 10.3). The Grotta, for centuries an attraction for curious travellers, was a cave where a mysterious, odourless vapour killed off forms of life that were forced to breathe near ground level. The guardian of the grotto made a business out of demonstrating to the visitors

<sup>44</sup> Nollet, *Journal*, 106f.

that a dog would go into convulsions when forced to breathe near the ground inside the cave, but would soon recover its vital functions if freed and taken outside, to breathe by the nearby lake. Such a demonstration gave the cave its name and attracted people even from far away. Travel guides abounded with the descriptions of famous visitors' trials with suffocating dogs, birds, reptiles or even servants. Misson published a list of famous 'experimenters' that included the French king, Charles VIII.<sup>45</sup> Thus, Nollet's willingness to carry out experiments at the Grotta was not a novelty, although his experimental practice was tuned to the most up to date methods and instruments of experimental philosophy. Once in the grotto, accompanied by two Neapolitan philosophers, Nollet measured both the temperature (with a Réaumur thermometer) and the humidity of the surrounding air. Transforming the grotto from a place of idle curiosity and wonder into a chemical laboratory for the analysis of 'airs', Nollet noticed that the mysterious vapour was warmer than the air outside, and that the ground in the cave was humid. He studied the relative density of the air, the vapour and the smoke of a candle whose flame was soon extinguished in the grotto. He tried the dog experiment on various forms of life, including insects, worms and reptiles, and on himself. Although he admitted that the nature of the fluid remained a mystery, even after his experiments, he emphasised the novelty of his approach:

it is not by the bare extinction of animal life that a judgement can be formed ... it is rather by examining the vapour itself, with a view to knowing its nature, or at least some of its essential qualities; and in this view it was that I prosecuted my experiments.<sup>46</sup>

On the basis of his trials Nollet concluded that the local belief in the vivifying properties of the nearby lake was wrong, as was the idea that the vapour acted as a poison. The vapour was a fluid, heavier than air, which killed animals because they could not breathe in it: '[they] are drowned in a fluid incapable of supplying the place of the air, which they want.'<sup>47</sup>

In spite of Nollet's professed battle in the name of truth, not all the prodigies he had encountered could be publicly discredited, even when they seemed quite evidently fraudulent. When he arrived in Naples, for example, he was astonished by the number of people of all social classes assembled in the Duomo, waiting for San Gennaro's blood (kept in a reliquary) to liquefy, and by their total involvement in the event. He attended the ceremony for a few days, during which the blood remained hard, to the dismay of the

<sup>45</sup> Misson, *Voyage*, 63–6. In modern terms, the 'odourless vapour' that killed small animals is carbon dioxide, often exhaled from the underground in volcanic areas: being denser than air, it sinks to the cave's ground.

<sup>46</sup> J. A. Nollet, 'Extract of the Observations made by the Abbé Nollet on the *Grotta de Cane*' in *Philosophical Transactions of the Royal Society* (1751–2), 48–61 at 55.

<sup>47</sup> Nollet, 'Observations ... on the *Grotta de Cane*', 59.

Neapolitans: 'women fell into convulsions' while men anticipated terrible events for the year to come at the sight of the blood still 'duro duro duro'.<sup>48</sup> But when, after what seemed an endless time, the long-awaited liquefaction took place, the people, released from their visions of imminent apocalypse, ran into the streets, exulting and rejoicing. 'This is the Neapolitans' pretension, here is what I saw', he wrote in his diary.<sup>49</sup> To Nollet, the presumed miracle was simply the result of the heating and shaking of the glass vessel that contained a blood-like substance: during the ceremony the priest handed the reliquary to several people who kissed it repeatedly, and when they returned it, he placed it near the flames of candles so as to observe whether it was still hard. It was obvious to Nollet that 'in the end, with all the kissing and handling and casting light on the relic with a candle', the upper part of the presumed blood softened, 'as is usual for a solid substance that begins to melt inside a vase whose sides are warmed up'.<sup>50</sup> He was 'very negatively impressed by this abuse', and the same evening, while having dinner with ten Neapolitans, he said frankly what he thought of the miracle of San Gennaro:

Sirs ... if what I saw is truly the blood of a Martyr and Saint, I respect it whether it is hard or soft; but nothing seems to me less miraculous than a substance that could be a completely different thing than blood, melting when it is warmed up.<sup>51</sup>

This was his only challenge to the miracle of San Gennaro. Miracles were the property of the church, and it was not up to (and probably not even the aim of) an abbé to fight against superstition when it was disguised as faith. Whereas the attack on the love of the marvellous was a *topos* of Enlightened natural philosophy, disbelief in presumed miracles had to be left to Enlightened sarcasm. There was nothing new for Nollet to add to what Montesquieu and De Brosses had already written about it, and during his private audience with the Pope, a patron of the sciences, natural philosophy was a much more convenient subject to talk about.<sup>52</sup>

Wrestling with wonders proved for Nollet a winning move. At the end of 1749, when he returned from his nine-month tour, his various accounts were published in the *Mémoires* of the Académie Royale des Sciences and in the *Philosophical Transactions* of the Royal Society of London.<sup>53</sup> For a philosopher

<sup>48</sup> Nollet, *Journal*, 172<sup>r</sup>.

<sup>49</sup> Nollet, *Journal*, 173<sup>r</sup>. 'Voilà la pretention des Napolitans; voici ce que j'ay vû.'

<sup>50</sup> Nollet, *Journal*, 173<sup>v</sup> and 174<sup>r</sup>. 'Comme a costume de faire une matiere durée, qui commende a se fondre dans un vaisseau dont on chauffe les parois.'

<sup>51</sup> Nollet, *Journal*, 174<sup>v</sup>. 'Msr ... si ce que j'ay vû est veritablement le sang d'un St. Martyr, je le respecte autant dur que mol; mais rien ne me paroît moins miraculeuse que de croire une matiere, qui peut être toute autre chose que dû sang, se fondre quand on la chauffe.'

<sup>52</sup> Nollet, *Journal*, 149<sup>v</sup>. Bertucci, 'Sparking Controversy'.

<sup>53</sup> J. A. Nollet, 'Expériences et observations en différens endroits d'Italie' in *Mémoires de l'Académie des Sciences de Paris* (1749), 444–88; 'Suite'; 'Observations ... on the Grotta de Cane';

who made his battle against the love of the marvellous a recurrent refrain (at least at the rhetorical level), the abundance of 'marvels of nature and art' in the Italian peninsula offered an excellent opportunity to gain credit in the enlightened Republic of Letters. Just like a collector returning from his tour, when he was back in Paris Nollet negotiated the value of what he had seen and done south of the Alps. His experiments in the sites of famous, mysterious natural phenomena were for his fellow philosophers irresistible curiosities. In this context, Nollet applied the anti-marvellous register, emphasising the credulity of the locals and counterpoising his experimental procedures. Whereas superstition, deception and love of the marvellous left the ignorant with his or her mouth open, the philosopher, animated by love of truth, engaged in experimenting upon nature so as to include the apparently extraordinary within the order of nature. In this respect, wonders were there for philosophers to show that there was nothing really wonderful in them. As exceptions that proved the rule, they even strengthened the explanatory power of natural philosophical systems. Beyond the Enlightenment rhetoric, however, it was the 'wonderful' in experimental philosophy that facilitated Nollet's connections with the Italian aristocracy and the academic élites. If on the one hand, in his published report, he pointed to the Italians' 'love of the marvellous' as responsible for their erroneous conclusions, on the other, the natural and artificial marvels that in Italy abounded formed part of the cultural landscape in which his tour had taken place. Apart from the literary construction of the disinterested philosopher in search of truth, who fought against credulity and 'love of the marvellous', individual careers, as Nollet's own testifies, were cast against the background of a patronage system that was still sensitive to the unusual, the rare and the wonderful. Far from being ignored by natural philosophers, wonder and wonders could, simultaneously, please patrons in search of amusement, and offer competitive and ambitious individuals like Nollet the opportunity to prove their philosophical worth. Whether endorsed or debunked, wonders and marvellous phenomena still provided valuable opportunities for individuals to carve out niches for themselves, and through which their reputation would shine.

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'Extract of a letter from the Abbé Nollet, FRS &c. to Charles Duke of Richmond, FRS accompanying an examination of certain Phaenomena in electricity, published in Italy', *Philosophical Transactions of the Royal Society of London*, 46 (1749–50), 368–97.

# Curiosity and Wonder from the Renaissance to the Enlightenment

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Edited by R. J. W. Evans and Alexander Marr

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