

CHAPTER 1

Lavoisier and the French Chemical Heritage at the Musée Centennal of the Paris World Exhibition (1900)

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The records of early modern science have survived primarily in form of manuscripts, letters, and printed works. With the exception of a few emblematic cases, natural collections, instruments, apparatus and machines have rarely attracted the attention of historians, even when they were mostly scientists, as was the case until the beginning of the twentieth century. Unless these material sources could be used for didactic purposes of contemporary science or in the display of ephemeral shows, they were dispersed. Exceptions to this trend are the cases in which an instrument or a device has

become a historic relic that evokes the heroic personality and the scientific achievements of its owner. Typical examples of this are the telescopes of Galileo, which were immediately cherished as symbols of the power of science as well as of their inventor. The survival of such relics is more due to contingent circumstances than to a deliberate design to preserve them in association with historical records that document their creation and cultural context.

The history of science has been characterized by both the didactic and the symbolic power of scientific heritage until recent times, when it finally became an integral part of the historical narrative. Within this problematic framework, the preservation of the chemical heritage had to face additional difficulties; the relative simplicity and recyclability of the apparatus, the deterioration of the collections of chemicals and the low epistemological status of chemistry are all

factors that have contributed to the dispersal of historical collections. Indeed, in comparison with other sciences, medicine, physics, and astronomy in particular, it took a long time before chemistry and its material culture became a topic that attracted the attention of both historians and museum curators. In its early stages, the fate of chemical heritage was connected to the reverence paid to emblematic figures, such as that of Antoine-Laurent Lavoisier, whose biographies helped to elevate the social status of chemistry. Regardless of the role attributed to Lavoisier during the chemical revolution, both his contemporaries and historians agree that he did contribute to the enhancement of chemistry as a theoretical science and emancipated it from its ambiguous ties with alchemy.¹ The emphasis on the central importance of pneumatic chemistry brought a radical change to the apparatus used in chemical laboratories and the precision required by the new instruments attracted general attention. By fortunate circumstances, the fate of Lavoisier's collection is interwoven with the reassessment of scientific heritage that followed the outbreak of the French Revolution.

This process of enhancing scientific heritage and organizing its public display was favored by the dramatic changes brought about by the French Revolution. A decree of the Convention Nationale dated 6 February 1794, ordered the members of the Commission temporaire des arts and of the Commission d'instruction publique to "make an inventory and to bring together all the scientific and artistic objects in suitable depots, be they from formerly religious houses, from émigrés, from conspirators or from the civil list."² The vast collections of the instruments and natural specimens confiscated by the Republic and stored in various Parisian institutions now needed to be inventoried and preserved. At that time, the political circumstances seemed to be favorable for such novel undertakings.

The closing of the royal academies in July 1793 had forced scientists to seek new forms of institutional organizations and to justify the social value of science and technology to the Republican authorities and the country's representatives. The public display and demonstration of scientific heritage seemed to satisfy the widespread need of understanding what made science such an important endeavor. Public scientific demonstrations, no doubt, began to attract the attention of Enlightenment audiences decades before,³ but they were more the effect of individual performance and ephemeral fashions than of a deliberate and systematic campaign. Furthermore, the appreciation of scientific heritage was not as prominent as during the years of the French Revolution. Indeed, with the fall of the *Ancien régime*, the time was ripe to weigh the progress made by the sciences and arts and to celebrate the irreversibility of all that had been gained. Within the comprehensive reforms of public education that followed the outbreak of the Revolution, it was not surprising that the evaluation of scientific heritage was given a central ideological importance. In response to the invitation given by the anatomist Felix Vicq D'Azyr to extend the recent notion of heritage to science and technology, on 29 September 1794 the Abbé Henri Grégoire submitted his *Rapport sur l'établissement d'un conservatoire des arts et métiers* to the Convention Nationale. Influenced by Francis Bacon's utilitarian vision of science, Abbé Grégoire underlined that the dangers threatening the Republic from 1791 through 1793 had been warded

off by technical inventions, which helped the republican army obtain unprecedented successes and demonstrated the decisive and strategic role of scientists in the survival of the nation. Accordingly, scientific heritage, which made the birth of a new nation possible, should be considered an indispensable resource of a modern and renewed culture. To facilitate a full evaluation of such a heritage, which had been ignored for many years, a new type of institution, alongside the museums, archives, and libraries, should be conceived and created.

The principal purpose of an institution designed to preserve past inventions then lay in the recognition of the social and political value of arts and sciences:

You want all the sciences to be directed towards a useful goal, and the point of convergence for all their discoveries to be the physical and moral prosperity of the Republic: you want each citizen to be able to earn his living by practicing some art, whatever it may be. We think that we have understood your views when we propose to use the vast collections of machines as soon as possible by establishing a conservatory that will unite them in one building.⁴

The purpose of the preservation, cataloguing, and public exhibition of collections of instruments and inventions would then be to reveal the material nature of scientific and technical practice to contemporaries and posterity, and to allow the general public to understand what had previously been perceived as the mysteries enshrouding the world of arts and crafts.

The Chemical Heritage Saved by the Chemical Revolution

The Conservatoire des arts et métiers set a model that other institutions followed. Its successful effort, which allowed important scientific collections to be preserved, excluded chemistry, and exhibitions focused on chemical arts instead. The reason for such an exclusion was twofold: first, the reputation of chemistry as a science at the beginning of the nineteenth century was still problematic. The chemical revolution identified with the work of Lavoisier helped to change the image of chemistry and erase its links with the alchemical tradition. However, the position of chemistry among other sciences had not yet substantially improved. While the protagonists of the progress in exact sciences emphasized the importance of the theoretical and philosophical sources of their inspiration, the most successful chemists of the first half of the nineteenth century (Justus von Liebig, for example) focused on the artisanal and applicative aspects of their science. Furthermore, academic chemistry was seen as a practical art with ambiguous relation to the emerging pharmaceutical and chemical industries. But there is another important factor that deterred the collection and exhibition of chemical heritage. As briefly mentioned previously, the historical collections of the Conservatoire des arts et métiers and of the European institutions that followed its model primarily served a didactic purpose. Jean Nollet's collection of instruments of experimental physics or Jacques de Vaucanson's collections of mechanical devices could still serve, at the beginning of the nineteenth century, for public demonstrations as an

introduction to physics and mechanics. That was not the case in chemistry; on the rare occasions they survived, historical chemical apparatuses could not be successfully used in public demonstrations. Moreover, because of the rapid deterioration they suffered under the constant actions of fire or chemicals meant that they were not intended for durable use. Last but not least, until the 1770s the composition of the apparatuses was extremely simple and made by artifacts that could be found in a common pharmacy or even in the kitchen. It is not surprising then that nearly nothing from early modern celebrities such as Paracelsus, Robert Boyle, or Georg Ernst Stahl, has survived besides their written words.

The change in this situation came with Lavoisier. As it is well known, Lavoisier built up one of the most sophisticated chemical laboratories in Europe during the 1770s and 1780s. He was guillotined on 8 May 1794, and his tragic end at the very moment when the discussion on the preservation of scientific heritage had reached its peak, soon made him the most distinguished martyr of science. Lavoisier's martyrdom helped to encourage a new attitude both towards chemistry and its main hero. Indeed, Lavoisier's wife created a sort of museum devoted to the memory of her late husband soon after his death.⁵

Madame Lavoisier's salon, housed in a beautiful residence in *Rue d'Anjou*, today *Faubourg St. Honoré*, was frequented by scientists such as Pierre-Simon Laplace, Jean-Baptiste Biot, and Joseph Louis Gay-Lussac, and by philosophers such as Pierre Jean Georges Cabanis, Benjamin Constant, and François Guizot. As reported by Delahante, one of the privileged members of this group, Madame Lavoisier's house became a sort of reliquary, where the reminders of her husband were revered with the greatest devotion.⁶ It is thus hardly surprising that during the nineteenth century Lavoisier became a symbol of French chemistry, and that as early as the 1830s Jean Baptiste Dumas conceived the grand design to initiate the national edition of his collected works. Following the nationalistic wave rising throughout Europe, this project aimed to show the superiority of the French chemical tradition over those of the German and the British. The fame of Lavoisier and the publication of the first volumes of his collected works raised a fierce controversy between French and German chemists over the role Lavoisier played in the history of chemistry during the late 1860s; the debate was intensified with the outbreak of the Franco-Prussian War in 1870. Adolphe Wurtz's famous incipit to his work on the evolution of chemical concepts stating that chemistry was a French science founded by Lavoisier⁷ was rebutted by the German chemical community, and the history of chemistry suddenly became an important field that attracted the attention of the most authoritative chemists of the time.⁸ Within this context, artifacts also began to play an important role. On the occasion of the grandiose exhibition of scientific instruments and apparatuses at the South Kensington Museum in March 1876, scientists from all over the world competed to vindicate the venerable and prestigious achievements of their national traditions. Although the organizers initially took the Conservatoire des arts et métiers as a model and wished to create a "Science Museum," the final result was in fact quite different.

In International Exhibitions a certain amount of space is allotted to each country. These spaces are then divided by the Commissioners of each country among its exhibitors, who display their objects—subject to certain general rules of classification—as they consider most advantageous, retaining the custody of their own property. The expenses of transport, arrangement, etc., are borne by the countries who exhibit. And the Exhibitions appeal naturally, more or less exclusively, to the industrial or trade-producing interests of those countries.⁹

This was not the idea of the proposed Loan Collection at South Kensington. For that Collection it was desired to obtain not only apparatus and objects from manufacturers, but also objects of historic interest from museums and private cabinets, where they are treasured as sacred relics, as well as apparatus in present use in the Laboratories of Professors. The transport of all objects was undertaken by the English government, and they were to be handed over indefinitely to the custody of the Science and Art Department for exhibition; the arrangement being not by countries but strictly according to the general classification.¹⁰

Relics and historic collections were extensively used to cultural and educational purpose.¹¹ Galileo's and Newton's instruments were for the first time attracting the attention of tens of thousands of visitors. While British, German, and Italian exhibitions were organized with the greatest care in order to emphasize their prominent role in the history of science through the display of historic artifacts, France was not equally successful, and especially so in chemistry. Lavoisier's calorimeter—one of the landmarks of the chemical revolution and the only piece from the French chemist's collection brought from Paris to the exhibition—was displayed in the section devoted to heat, between exhibits devoted to thermometry and conduction. Furthermore, the apparatus was displayed without any reference to its historical background. In the section about chemistry, situated in the West Gallery, a "historical" subsection exhibited several balances from the collections of Joseph Black, Henry Cavendish, and Joseph Priestley, and left visitors with the vivid impression that pneumatic chemistry was primarily a British invention and that the standard of precision in the chemical laboratory anticipated Lavoisier's efforts by decades. Nineteenth-century chemistry was dominated by British and German collections and the shows provided overwhelming material evidence of this. The London Exhibition clearly showed that the enhancement of ancient scientific instruments could successfully be used to promote an ideological and nationalistic view of science, and it did not take too long before this view was shared by French chemists as well.

Not surprisingly, the French revival of chemical heritage revolved around Lavoisier, the national hero of the chemical revolution. During the early 1860s, Jean Baptiste Dumas promoted the publication of his collected works,¹² and during the late 1830s, the heirs donated a significant part of Lavoisier's manuscripts as well as 40 instruments from his laboratory to the Académie des sciences. The donation consisted of six areometers;¹³ Fortin's air pump made in 1792;¹⁴ Naudin's calorimeter of 1782;¹⁵ 30 decimal units for measuring capacity, probably used during the reform of

weights and measures of 1789;¹⁶ the balance made by Chemin in 1770;¹⁷ a balance made in 1775;¹⁸ Mégnié's two famous gasometers made in 1787;¹⁹ Lavoisier and Laplace's ice calorimeter;²⁰ a few tubes to be used in the construction of thermometers;²¹ the glass vessel with electrodes used by Lavoisier and Meusnier de la Place for studying the combustion of hydrogen in the presence of oxygen under a constant flow of the reacting gases;²² Fortin's apparatus for the combustion of oil;²³ as well as his apparatus for studying wine fermentation, both made in 1789;²⁴ Mégnié's barometers (1778);²⁵ and a burning glass.²⁶ This important donation was divided: while the manuscripts and books remained at the Académie, the instruments were deposited, sometime after 1866, to the Conservatoire des arts et métiers. The collection was probably displayed only years later, possibly after the South Kensington exhibition of 1876.²⁷ Most of the Lavoisier's instruments preserved at the Conservatoire were displayed in a large glass showcase, and although there was no apparent order in their disposition, the ensemble made its own figure. Since the showcase was not large enough to keep all the instruments, only a few apparatuses, such as the those used by Lavoisier in his experiments on vinous fermentation and on the combustion of oils, were displayed on the sides of the case. The show was of considerable importance because this was the first historical collection of a chemist to be exhibited in a public museum. The publication of Lavoisier's *Oeuvres*, the donation made to the French government by the heirs, and the rising controversy over the role of Lavoisier in the history of chemistry, inspired further historical research. In 1888 and 1890 two important biographies were published, authored by Edouard Grimaux and Marcellin Berthelot, respectively. The heirs, still in possession of the large collection of Lavoisier's instruments, made it their duty to preserve them in their original state at the Château de la Canière in Puy de Dôme.

In 1879, a professor of chemistry of the University of Clermont-Ferrand, P. Truchot, published the first and last extensive report on Lavoisier's collection of instruments:

His [Lavoisier's] chemical laboratory and his physical cabinet have been piously conserved by Mme Lavoisier's family and I'm indebted to Etienne de Chazelles, its present fortunate owner, who has given me the pleasure, not to say the happiness, of being able to get to know the collection by making an inventory and touching one by one, understandably not without emotion, all the objects that remind us of the prolific work of by the immortal founder of Chemistry . . .²⁸

Let us now open the cabinet. *The large amount of apparatus accumulated there shows the respectful care with which the family of Lavoisier has felt it a duty to save even occasionally commonplace objects from destruction.*²⁹ [emphasis by M. Beretta]

The end of the nineteenth century marked the preparation of the centennial celebration of the French Revolution, and one of its main protagonists happened to be both a chemist and a distinguished historian: Marcellin Berthelot. Besides being an influential scientist, Berthelot occupied prestigious and influential political positions, such as that of minister of foreign affairs and minister of public instructions.

The Chemical Heritage at the Musée Centennal

Under the auspices of the Académie des sciences, the French chemical community, guided by Berthelot, decided to celebrate the achievements of Lavoisier as the founder of modern chemistry with a monumental statue. Between 1894 and 1900, more than 100,000 francs were collected in France, Russia, among many other European countries, and in the United States. The statue (Figure 1) was completed in July 1900. In his speech at the statue's inauguration, Marcellin Berthelot emphasized that the French chemist, "established the points of the departure of modern science," and that the law of conservation of mass was the foundational tenet of modern chemistry—so much so that chemical atomism would have been inconceivable without it.³⁰ The image of the scientist was becoming that of an anonymous hero. Lavoisier now represented the symbol of French science, and its achievements were most often used to celebrate the strong national identity, which, from Dumas to Berthelot, pervaded French chemistry.³¹

The date of its inauguration coincided with the opening of the international congress of pure and applied chemistry and preceded by a few months the opening of the *Exposition universelle internationale de 1900*, where Berthelot and Louis Troost organized an exhibition, and the *Musée Centennal de la classe 87*, which celebrated Lavoisier and French chemistry. (Figure 2) The congress, the exhibition, and the symbolic unveiling of the statue were all the result of an energetic campaign by which Berthelot sought to show the primacy of chemistry, Lavoisier, the French nation, and, to some degree, himself.³²

The Musée Centennial was one of many exhibitions at the time that were devoted to arts and crafts, but it was the most important because it focused exclusively on the history and achievements of a French science: chemistry. It should be noted that the exhibition was subtitled *Arts chimiques et pharmacie: materiel, procédés et produits*, and by this choice, was aimed at presenting chemistry as a useful art rather than a theoretical and speculative science. The connection with industries and manufactures was indeed emphasized by many of the items displayed in the show, but their arrangement followed a quite ambitious design. The objects, instruments, and chemicals were in fact displayed in a way that narrated a history of great French chemical scientists, inventors, and entrepreneurs. Although several showcases displayed the recent achievements of the science, the overall perspective of the show was historical. This choice was inspired by several factors:

1. The organizers probably wished to emulate the success of the South Kensington exhibition, which, as we have already shown, put a great emphasis on the history of scientific instruments.
2. The French chemists wished to vindicate the prominence of their national tradition, and historical collections—particularly that of Lavoisier—provided a compelling picture.
3. Marcellin Berthelot, one of prime movers of the exhibition, was also a distinguished historian of chemistry, and he extensively used examples and stories taken from the past to design the boundaries of contemporary French chemistry.



Figure 1. The statue of Lavoisier by Louis Ernest Barrias inaugurated in 1900. Private collection.

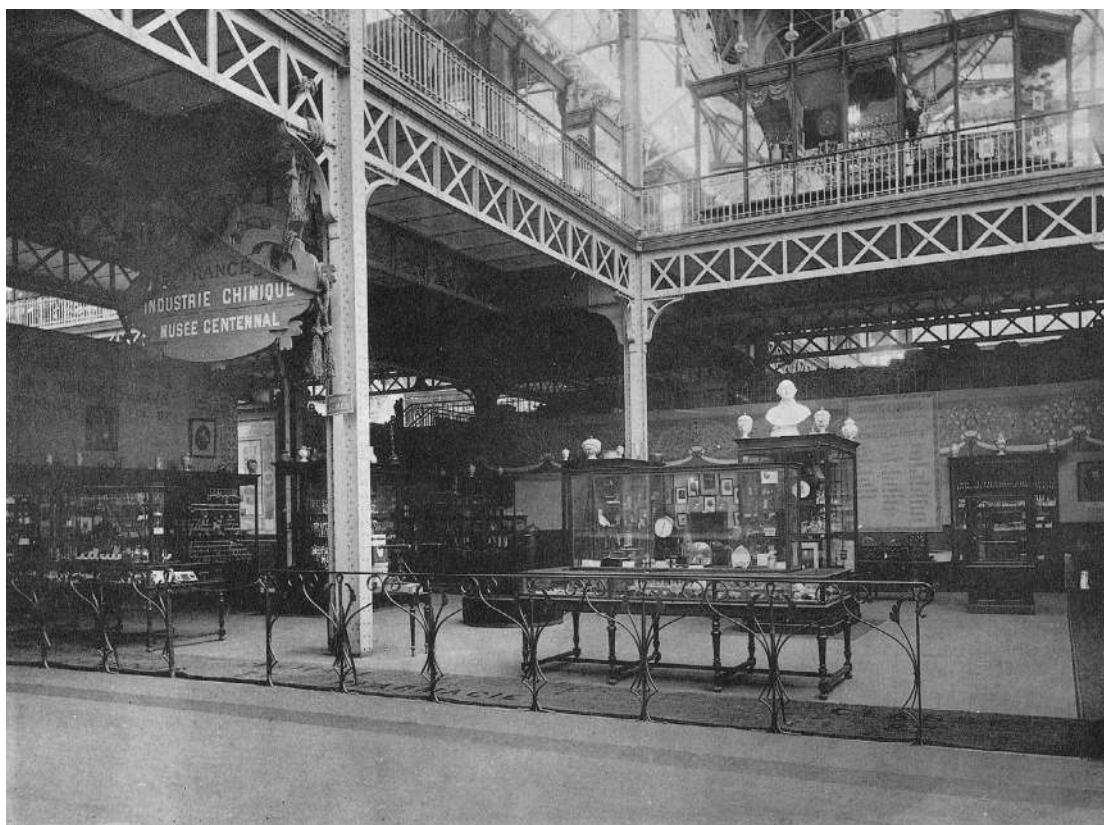


Figure 2. View of the Musée Centennial de la classe 87, 1900. From the *Musée Centennial de la classe 87, Arts chimiques et pharmacie* catalog (1900).

Like the Conservatoire des arts et métiers, the Musée Centennial proposed an exhibition mixing chemical heritage and contemporary artifacts. The former, however, was much more consistent in celebrating the firsts of French chemistry. Moreover, it did so by highlighting the contributions of individuals. The Musée Centennial was in fact the first time that French chemistry was presented historically through its artifacts, instruments, machines, chemicals and, in lesser measure, written documents left by its main protagonists. It is significant that the exhibition was limited to the French chemists. “Science,” admitted the anonymous author of the introduction to the catalog, had “no fatherland,” but for the sake of consistency it was found necessary to focus on the French context. The logic behind the nationalistic choice was historical. As Lavoisier was the “founder of modern chemistry,” only the French lineage of chemists, from Berthollet to Berthelot, could reveal in the purest form its rapid progress. The catalog of the exhibition, illustrated with many interesting photos, focused on the protagonists of French chemistry and on their short biographies rather than on the objects and the apparatuses. By doing so, the catalog deviated from the aim of the exhibition, which, as its subtitle explicitly announces, wished to illustrate to the public the products of the chemical research. The emphasis on the personalities and on the achievements of the heroes of science was not in contradiction to the very nature of their science, which was appropriately embodied into the Centennial Museum of Arts and Crafts. In many

respects, the 1900 French exhibition is a response to the British chemical show of 1876, and the French chemical community made it clear that it had both a venerable history and a strong identity. Apart from the ideology that had inspired this initiative, the Musée Centennial of chemistry was a very fine exhibition where, among other things, various instruments, manuscripts, and iconographic items were displayed for the first time. Many private enthusiastic collectors were successfully involved and, thanks to their contributions, important collections found their way to a new home. In this connection, it is interesting to mention the donation of Charles Frédéric Gerhardt's collections of chemicals and apparatus, made by his son, to the exhibition and to the faculty of science of Paris.³³ The exhibition followed a chronological order, but as it turned out, the relics and collections available did not always represent the most important chemists of whom, apart from printed works and manuscripts, nothing survived. Dense showcases displayed furnaces, glassware, chemicals, instruments, balances and, in a few cases, large models (Figure 3). The collections came mainly from the principal research institutions of France: the Académie des sciences, the École polytechnique, the Sorbonne, the Conservatoire des arts et métiers, the École normale, the École des mines, the Muséum d'histoire naturelle, and the science faculties of Rennes, Dijon, Montpellier, and Nancy.

In addition to this massive participation of academic institutions, it is worth noting the loans made by the glass manufacturer of Saint Gobain and of the Musée d'art et d'industriel de Lyon. Such loans demonstrate that, along with the extraordinary development of German chemical industries, France also had a competitive history of success, culminating in the leading role played by Berthelot who, like Lavoisier, divided his time between theoretical and applied chemistry. Indeed, the general image one gets from the exhibition and its presentation catalog is that of a useful science that takes pride in revealing its historical ties with industrial arts and applications and that it was precisely because of these ties that chemistry could successfully presents itself to the public of the Musée Centennial and, more generally, to that of the universal exhibition. Chemistry, unlike other sciences, had a pervasive presence in all the societal activities and French chemists provided outstanding contributions to the development of the nation.

This nationalistic narrative of the history of French chemistry was not the only purpose of the exhibition. The intention of the organizers was in fact to build up a permanent museum of French chemistry, but for various reasons this project was never carried out and the collection was again dispersed. The outbreak of World War I and the prominent role of chemical warfare redirected the attention of French chemists to more urgent issues. During the war years, the history of science and concerns over the preservation of scientific heritage lost the importance they had in 1900. When, after World War I, the French chemical community sought to give a new institutional strength to their community, the display of historical heritage was no longer on their agenda. In 1927, coinciding with the celebration of the centenary of Marcellin Berthelot's birth, the first steps were taken towards the foundation of the Maison de la chimie. When in 1934 the institution was finally inaugurated in the spacious halls of the sumptuous Hôtel de la Rochefoucauld d'Estissac, no space was allocated to a museum or exhibition illustrating the history of



Figure 3. The showcase of the Musée Centennial, devoted to Lavoisier, displayed several instruments and iconographic items that were eventually dispersed. From the *Musée Centennial de la classe 87, Arts chimiques et pharmacie* catalog (1900).

French chemistry, and the perilous fate of the collections exhibited in 1900 remained in the hands of the universities and private owners.

Notes

1. M. Beretta, "Transmutations and Frauds in Enlightened Paris: Lavoisier and Alchemy," in *Fakes!? Hoaxes, Counterfeits and Deception in Early Modern Science*, eds. M. Beretta and M. Conforti (Sagamore Beach: Science History Publications/USA, 2014), 69–108.
2. "Inventorier et faire réunir dans des dépôts convenables, tous les objets de sciences et arts provenant, soit des maisons ci-devant religieuses, soit des émigrés, soit des conspirateurs, soit de la liste civile." Quoted in Auguste Anastasi, *Nicolas Leblanc. Sa vie, ses travaux et l'histoire de la soude artificielle* (Paris: Hachette, 1884), 33.
3. B. Bensaude-Vincent and C. Blondel, eds., *Science and Spectacle in the European Enlightenment* (Bodmin: Ashgate, 2008).
4. "Vous voulez que toutes les sciences se dirigent vers un but utile, et que le point de coïncidence de toutes leurs découvertes soit la prospérité physique et morale de la République: vous voulez que chaque citoyen puisse assurer sa subsistance par l'exercice d'un art quelconque. Nous croyons entrer dans vos vues en vous proposant d'utiliser au plus tôt ces vastes collections de machines par l'établissement d'un conservatoire qui les réunira dans un local commun." Abbé Henri Grégoire, *Convention Nationale. Instruction publique. Rapport sur l'établissement d'un conservatoire des arts et métiers. Séance du 8 vendémiaire, an 3* (Paris: 1794).
5. M. Beretta, "Lavoisier's Collection of Instruments: A Checkered History," in *Musa Musaei: Studies on Scientific Instruments and Collections in Honour of Mara Miniati*, ed. M. Beretta, P. Galluzzi, and C. Triarico, (Florence: Leo S. Olschki, 2003), 313–334.
6. A. Delahante, *Une famille de finance au XVIIIe siècle*, 2 vols. (Paris: Hetzel, 1880), vol. 2, 546.
7. "La chimie est une science française: elle fut constituée par Lavoisier, d'immortelle mémoire," in C. A. Wurtz, *Histoire des doctrines chimiques depuis Lavoisier jusqu'à nos jours* (Paris: Hachette, 1869), 1.
8. M. Beretta, "The Changing Role of the Historiography of Chemistry in Continental Europe since 1800," *Ambix* 58 (2011): 257–276.
9. "Their Lordships stated their conviction that the development of the Educational, and certain other Departments of the South Kensington Museum and their enlargement into a Museum somewhat of the nature of the Conservatoire des arts et métiers in Paris, and other similar institutions on the Continent, would tend to the advancement of science, and be of great service to the industrial progress of this country." *Catalogue of the Special Loan Collection of Scientific Apparatus at the South Kensington Museum* (1876), 3rd ed. (London: Eyre, 1877), vol. 1, xi.
10. *Catalogue of the Special Loan Collection of Scientific Apparatus*, xiii.
11. R. Bud, "Responding to Stories: The 1876 Loan Collection of Scientific Apparatus and the Science Museum," *Science Museum Group Journal*, 1 (Spring 2014), <http://journal.sciencemuseum.ac.uk/browse/2014/responding-to-stories/> (accessed November 2016). <http://dx.doi.org/10.15180/140104/006>
12. C. Demeulenaere-Douyère, "A propos d'une entreprise intellectuelle: la publication des Œuvres et de la Correspondance de Lavoisier," *La Vie des Sciences, Comptes rendus, série générale*, 11 (1994): 319–332.
13. Musée des arts et métiers–Paris. N° 07508-0000. These were the instruments ideated by Lavoisier in 1768.
14. Musée des arts et métiers–Paris. N° 07517-0000.
15. Musée des arts et métiers–Paris. N° 07520-0000. This instrument was also used by Laplace during the experiments on heat.
16. Musée des arts et métiers–Paris. N° 07542-0001 and 07542-0002.
17. Musée des arts et métiers–Paris. N° 07544-0000.
18. Musée des arts et métiers–Paris. N° 07545-0000.
19. Musée des arts et métiers–Paris. N° 07547-0001.
20. Musée des arts et métiers–Paris. N° 07547-0002 up to N° 07547-0030.
21. Musée des arts et métiers–Paris. N° 07547-0004.
22. Musée des arts et métiers–Paris. N° 07548-0000.
23. Musée des arts et métiers–Paris. N° 07549-0000.
24. Musée des arts et métiers–Paris. N° 07550-0000 and 07551-0000.
25. Musée des arts et métiers–Paris. N° 07658-0000 and 08761-0000. The latter item was donated by Léon de Chazelles in 1867.
26. Musée des arts et métiers–Paris. N° 08229-0001. This item was donated by Léon de Chazelles in 1867.
27. The first official mention of the public permanent display of Lavoisier's collection at the Conservatoire dates from 1894 and coincides with the centenary of Lavoisier's death.
28. P. Truchot, "Les instruments de Lavoisier. Relation d'une visite à La Canière, où se trouvent réunis les appareils ayant servi à Lavoisier," *Annales de chimie*, 5e série, 18 (1879): 289–319.
29. "Son laboratoire [Lavoisier's] de Chimie, son cabinet de Physique ont été pieusement conservés par la famille de Mme Lavoisier, et je dois à M. Étienne de Chazelles, qui en est actuellement l'heureux possesseur, le plaisir, je devrais dire le bonheur, d'avoir pu en prendre connaissance, en dresser l'inventaire et toucher un à un, non sans émotion facile à comprendre, tous ces objets qui rappellent les travaux féconds de l'immortel fondateur de la Chimie. [. . .] Ouvrons maintenant le cabinet. La grande quantité d'appareils qui y sont accumulés témoigne du soin respectueux avec lequel la famille de Lavoisier a cru devoir préserver de la destruction des objets quelquefois vulgaires" (My italics), Truchot, "Les instruments de Lavoisier," 291–292.

30. "Telle est la base scientifique de toutes nos équations chimiques de composition et de constitution [. . .] La théorie atomique moderne n'aurait pu se constituer, tant que l'intervention de la chaleur et des agents analogues dans la formation des corps pesants était regardée comme un axiome [. . .] La balance des profits et des pertes en chimie appliquée repose sur cette grande loi, continuellement invoquée." M. Berthelot, *Inauguration du monument érigé à Lavoisier par une souscription internationale, sous le patronage de l'Académie des Sciences, le 27 Juillet, 1900* (Paris: Firmin Didot et C.ie, 1900), 14–15.
31. On the national identity of French chemistry and its ideology see the comprehensive study by U. Fell, *Disziplin, Profession und Nation. Die Ideologie der Chemie in Frankreich vom Zweiten Kaiserreich bis in die Zwischenkriegszeit* (Leipzig: Leipziger Universitätsverlag, 2000).
32. Significantly, one year later, on 24 November 1901, the international scientific community celebrated at a meeting at the Sorbonne Berthelot's 50 years of scientific activities. The transactions of the meeting were published in 1851–1901, *Cinquantenaire scientifique de M. Berthelot* (Paris: Gauthiers-Villars, 1902). In 1927 the centennial of Berthelot was celebrated with the erection of a statue and his commemoration in the Pantheon; much of the rhetoric spent in 1900 to celebrate Lavoisier as the champion of French chemistry was re-used to commemorate Berthelot. On this, see *Centenaire de Marcellin Berthelot, 1827–1927* (Paris: 1929) and the informative essay by R. Fox, "Science, Celebrity, Diplomacy: The Marcellin Berthelot Centenary, 1927," *Revue d'histoire des sciences* 69, no. 1 (2016), 77–115.
33. I was unable to locate the present location of the collections.

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