

# THE CHÂTEAU DE VERSAILLES DEVOTES AN EXHIBITION TO THE PLACE OF THE SCIENCES IN THE ROYAL COURT. GENUINE SCIENCE OR CURIOSITIES?

UNDER THE DIRECTION OF BÉATRIX SAULE, GENERAL MANAGER OF THE PUBLIC ESTABLISHMENT OF THE MUSEUM AND NATIONAL ESTATE OF VERSAILLES, AND CATHERINE ARMINJON, HONORARY GENERAL HERITAGE CURATOR.



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## SCIENCE AND CURIOSITIES AT THE COURT OF VERSAILLES

Outline of the exhibition by Béatrix Saule

### 1

#### THE PLACES OF SCIENCE IN VERSAILLES

As an introduction to the exhibition, under a reproduction of Coronelli's celestial globe, symbol of science in the service of the royal power because it presents the state of the night sky at the moment of the birth of Louis XIV, a full HD 360° video shows that the Château, its outbuildings, gardens and parks, and its surroundings, hosted all forms of scientific activity: application, experimentation, teaching, practical work and demonstration. Each aspect is covered in a section of the exhibition. However, Versailles was above all the place of power.



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### 2-1 & 2-2

#### SCIENCE AND POWER

Versailles was the official seat of the absolute monarchy for over a century, from 1682 to 1789, and the palace supervised and promoted the sciences in France notably through the Academy of Sciences. This period, which covers the end of the classical age and the Enlightenment period, saw considerable progress thanks to the crown's proactive scientific policy.



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1. 2. 3. 4. 5. 6. 7. 8. 9. 14. Colbert Presents to Louis XIV the Members of the Academy of Sciences, founded in 1666, (details), Henri Testelin



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### 2-1

#### THE FOUNDATION OF THE ROYAL ACADEMY OF SCIENCES

At this time, everywhere in Europe, scientists were grouped around rich patrons who supported them. Jean-Baptiste Colbert decided to attach them to the King with the aim of getting the sciences to serve the good of the state. In 1666, he gathered twelve scientists around the Dutchman Huygens, who were soon joined by other celebrities such as the Bolognese scientist Jean-Dominique Cassini who was to direct the Observatory set up the following year. The large painting by Testelin celebrates the foundation of the Academy and the Observatory by a visit made by the King to the Academy. The King is surrounded by his brother, Monsieur, and lords of his entourage. Colbert, in the centre of the composition and acting as intermediary, presents the Academicians to him. However, this is an imaginary representation because it was painted before the King's sole visit to the Academy on 5 December 1681.



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### 2-2

#### THE ROYAL TUTELAGE IN PRACTICE

In Versailles, the ministers in charge of supervising the sciences appointed members of the Academy, encouraged "investigations" (research) around the kingdom, subsidised expeditions to remote areas, and made grants to scientists. They favoured the branches of sciences likely to help meet the objectives of the royal power: astronomy for navigation, geometry and chemistry for the artillery, geodesics and cartography for the cadastral and fiscal administrations, medicine and pharmacology for public health, botany and agronomy to prevent famines, physics for its technical applications, etc. To accompany the promotion of the useful arts and techniques, the first engineering schools were founded: *Ponts et Chaussées* (Civil Engineering), *Génie maritime* (Naval Engineering), the Engineering school in Mezières for fortifications, and the School of Mines.



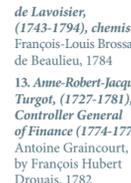
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10. Jean Le Rond d'Alembert (1717-1783), mathematician, director of the "Encyclopédie" until 1757, by Maurice Quentin de La Tour, 1773  
11. Louis XIV, Protector of the Arts and Sciences, Jean Garnier, 1672

12. Presumed portrait of Antoine-Laurent de Lavoisier, (1743-1794), chemist, François-Louis Brossard de Beaulieu, 1784  
13. Anne-Robert-Jacques Turgot, (1727-1781), Controller General of Finance (1774-1776), Antoine Graincourt, François Hubert Drouais, 1782



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The same period saw the founding of the Academy of Surgery, the Veterinary schools of Lyon and Alfort, the Agriculture Society and the Royal Society of Medicine. Many scientists, including the most prominent, worked in the court as health officers or tutors to the princes. This presence of learned experts attracted others. Quesnay, the doctor of Madame de Pompadour, received Diderot and d'Alembert in his apartment in the Château. The royal power did indeed ban the *Encyclopédie*, but that was because of the philosophical positions that it adopted, not for the compilation of knowledge and techniques that it had never ceased to encourage since Colbert.



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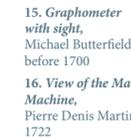
#### VERSAILLES, PLACE OF SCIENTIFIC APPLICATIONS

The unprecedented vastness of the Versailles construction project raised new problems. Apart from the traditional kinds of know-how, it required the input of new scientific knowledge and techniques. More so than for the buildings, these new needs concerned the gardens.

#### SURVEYING AND LEVELLING

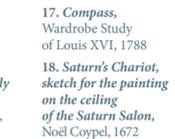
The land that surrounded the Château was not naturally conducive to the king's projects: it was not structured and could provide no usable water for the fountains. Before any work could begin, the land around the palace had to be mapped out in a surveying and levelling operation. Finding the water required going so far for it that new instruments and calculations taking the roundness of the earth's surface into account had to be found. These were developed and then improved through practice by a team of Academicians under an astronomer, the Abbé Jean Picard.

15. Graphometer with sight, Michael Butterfield, before 1700  
16. View of the Marly Machine, Pierre Denis Martin, 1722

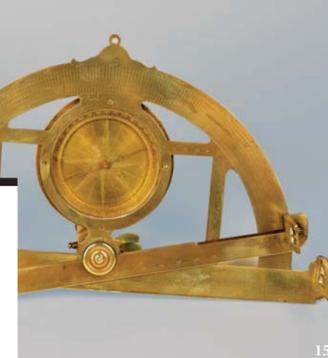


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17. Compass, Wardrobe Study of Louis XVI, 1788  
18. Saturn's Chariot, sketch for the painting on the ceiling of the Saturn Salon, Noël Coypel, 1672



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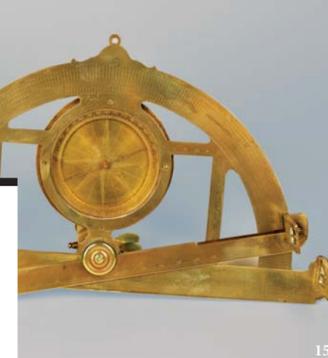
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#### THE PIPED WATER SUPPLY AND HYDRAULICS

To give Louis XIV the pleasure of fountains, 35,292 large barrels of water (around 9,500 m<sup>3</sup>) were required for 2½ hours of entertainment. Between 1670 and 1685, the time it took to lay down the great network in Versailles, the hydraulic problems mobilised scientists and engineers. Hitherto empirical practices gave way to scientific ones: Perrault, Mariotte, La Hire, Gobert, Picard and Römer carried out the first calculations of flow rates, and studies of the friction and resistance of materials for the piping systems. A technological development, the use of cast iron for the piping made up of standardised units fitting together without soldering, replaced earthenware, wooden or lead pipes. The adjutages, which gave the water jets their shape, were improved by the Francini family and, thanks to the advice of Huygens, the consumption of water was reduced.



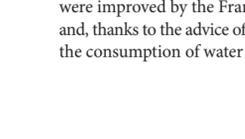
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#### THE PIPED WATER SUPPLY AND HYDRAULICS

The system functioned by gravitation, so not only was a lot of water needed but it had to come from higher ground. An elaborate system of pumps, aqueducts and reservoirs was then constructed. The gigantic machine of Marly drew the water of the Seine thanks to 14 paddle wheels. The aqueduct designed by Vauban and advised by the Academicians, turned out to be too ambitious, as it was supposed to stretch to 70 km from Versailles, and was never completed. Science and techniques were also drawn on in the most varied forms to ensure the embellishment and comfort of the royal residence. In return, they were glorified by being invoked in the decoration of the Grand Apartments in which each including the King's inner apartment (wardrobe of Louis XVI).



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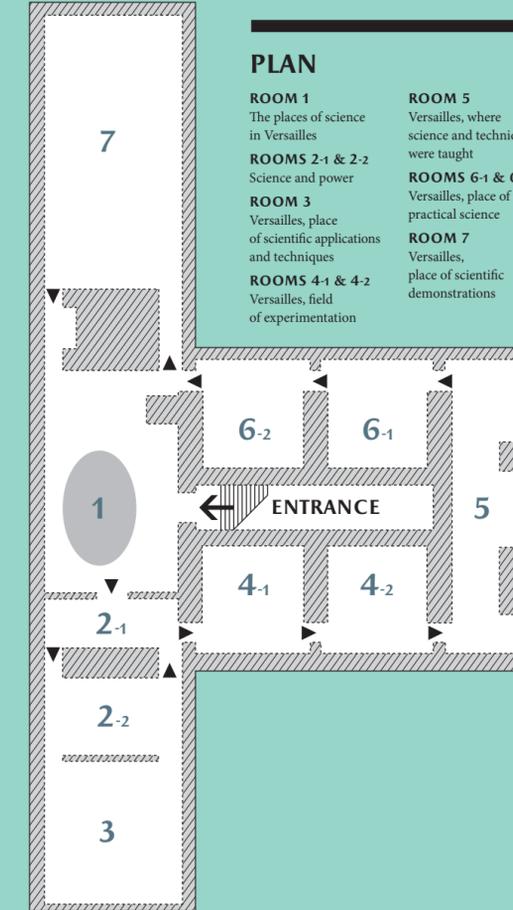
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#### PLAN

- ROOM 1**  
The places of science in Versailles
- ROOMS 2-1 & 2-2**  
Science and power
- ROOM 3**  
Versailles, place of scientific applications and techniques
- ROOMS 4-1 & 4-2**  
Versailles, field of experimentation
- ROOM 5**  
Versailles, where science and techniques were taught
- ROOMS 6-1 & 6-2**  
Versailles, place of royal practical science
- ROOM 7**  
Versailles, place of scientific demonstrations

## 4-1 & 4-2

### VERSAILLES, FIELD OF EXPERIMENTATION

Versailles offered resources for research in the palace and its outlying buildings: premises, collections and costly equipment.

## 4-1

### ZOOLOGY

From 1660 on, unprecedented progress was made in animal anatomy. The Menagerie de Versailles contributed to this by supplying the corpses of its animals to scientists. In preparation for the Academy's publication of the *Histoire naturelle des animaux*, a project supported by Colbert, Claude Perrault and Du Verney carried out dissections, sometimes on the spot. In 1681, Louis XIV watched the dissection of an elephant and a crocodile. Later on, La Peyronie, Senior Surgeon to Louis XV, then Buffon, the director of the Royal Garden in Paris (the future *Jardin des Plantes*) also used the animals of the royal zoo, notably the rhinoceros of Louis XV, for their studies. Inspired by M<sup>me</sup> de Pompadour, the great friend of Buffon, Louis XV had a new "domestic" menagerie built in Trianon from 1749 to 1751 which contained cow sheds, a sheepfold, hen houses and an aviary. It was built to entertain, but also for useful purposes: the acclimatization of foreign



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species, notably Dutch cows, and the improvement of native stocks. Louis XVI then had a model farm built in the Rambouillet estate which he had acquired for the acclimatization of merino sheep, drawing on the research made by Daubenton on cross-breeding species of sheep. Lafosse, from father to son, farriers in the stables of the *Petite Écurie*, both specialists in the medical care of horses, made advances in farriery, anatomy and veterinary science.

## 4-2

### BOTANY

Created to supply the royal tables, the king's Kitchen Garden, covering 9 hectares, was also a place of scientific experimentation directed by La Quintinie. Although he produced marvellous results in the cultivation of melons, peaches, pears and peas, his real innovations were with asparagus and figs as well as the large-scale use of very expensive cloches and glass forcing frames. In the 18<sup>th</sup> century, Le Normand father and son acclimatized coffee and pineapple plants here. When Louis XV decided in 1750 to lay out new gardens in Trianon, he entrusted the project to Claude Richard, a horticulturist and specialist in hothouses, who with his son Antoine went on to build up

the largest botanical collection in Europe with over 4,000 varieties. Trianon became a genuine research centre in botany. For over 30 years, plants arrived from all over the world, brought back by botanists from expeditions or exchanged with foreign scientists, such as the Swedish botanist Linnaeus. These new plants were acclimatized in three types of gardens: fruit, flower and botanical, equipped with hothouses and ponds for the aquatic plants. In 1759, Bernard de Jussieu, a botany demonstrator in the King's Medicinal Garden, produced the catalogue of this garden where the plants were distributed according to his new "natural" method. Duchesne carried out his experiments here on the hybridizing of strawberries, research which was fundamental for the evolution of species.

### AGRONOMY

The years after 1740 saw a sharp rise in interest in agronomy and the rural economy. On the personal initiative of Louis XV, agricultural experiments were conducted around Trianon on the prevention of rot in wheat and on the improvement of fodder and vegetable crops. Furthermore, in the mezzanine of the Château, Quesnay and his physiocratic friends collected agricultural and economic statistics for drawing up the *Tableau économique*, 1758 (economic table), a schematic presentation of the kingdom's economy.



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## 4-1 & 4-2

### MEDICINE, SURGERY, PHARMACOLOGY

The Court was not the setting for experiments as such but, by calling on the best scientific minds and promoting new techniques, it contributed to progress in the medical sciences. The King's doctors Fagon, Chirac, Helvétius, Sénac, Lassone and Vicq d'Azyr, the surgeons Félix, Maréchal, Dionis, La Peyronie and La Martinière, the apothecaries Lémery and the Boulduc dynasty marked the period with their publications and practices. When kings and princes submitted their royal body and blood to medical treatment, they made it exemplary and authoritative: the operation on the fistula of Louis XIV, the use of new remedies based on antimony, ipecac and cinchona, and the inoculation of the princes against smallpox after the death of Louis XV. To eliminate charlatans and poisoners, Louis XV set up the Commission for Secret Remedies most of whose members were officers of the Court. The Royal Society of Medicine replaced it in 1778.



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### VERSAILLES, WHERE SCIENCE AND TECHNIQUES WERE TAUGHT

From Louis XIV to Louis XVI, the teaching of science to the princes – before that limited to looking at the "curious" aspects of scientific phenomena and the acquisition of practical skills – was transformed into methodical courses taught by the greatest scientists at the cutting edge of their speciality.

The scientific subjects focussed on were geometry for the art of fortifications and for artillery, geography for the analysis of military maps and plans, and astronomy, regarded as a subject worthy of kings. In the mid-18<sup>th</sup> century, the experimental sciences (physics, chemistry) truly had their place in Versailles. The princes learned about animals and botany on walks around Trianon.

Then mathematics moved on from castrametation (the art of choosing and laying out the site of a camp or fortification), and naval matters became a separate science. The teaching of theory in the reign of Louis XIV was complemented by visits to the Academy, the Observatory and the King's Medicinal Garden. The young Louis XV also visited the studies and laboratories of pioneering researchers. When he returned to Versailles in 1722, libraries and laboratories were built. In 1744, Louis XV transformed the prestigious Cabinet of Medals of Louis XIV into a laboratory for the use of the Abbé Nollet, a pioneer in the new science of electricity, which later was transferred to the Hôtel des Menus-Plaisirs to become the Physics Laboratory of the royal children. On the eve of the Revolution, the ethnographic cabinet of curiosities of the Marquis de Serent was acquired for the princes. Alongside scientific instruments (globes, mathematics sets) and treatises dedicated to the young princes, the first teaching instruments appeared, with those of the Abbé Nollet in the front rank.

19. A Pineapple in a Pot, Jean-Baptiste Oudry, 1733

20. Antoine Parmentier (1737-1806), Agronomist and Botanist, François Dumont, l'Ainé, 1812

21. The Anatomical Angel, Jacques Gautier Dagoty, 1746

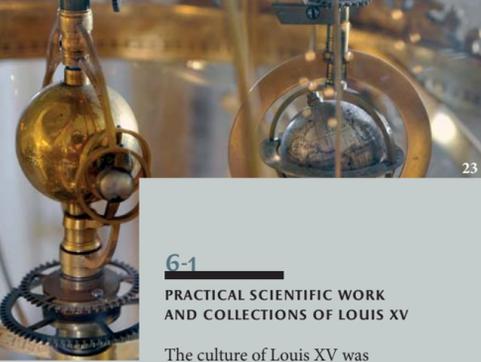
22. The Child Louis XV Receiving a Mathematics Lesson in the Presence of the Regent and Cardinal de Fleury, French school, early 18<sup>th</sup> century



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## 6-1

### PRACTICAL SCIENTIFIC WORK AND COLLECTIONS OF LOUIS XV

The culture of Louis XV was predominantly scientific. When he was just 7 he was passionately interested in geography and cartography; he discovered astronomy when he was 11. Alongside these classes he began to study anatomy and surgery and then developed an interest in botany. He read much, assiduously consulted the maps in his geography gallery, attended dissections, collected plants in Trianon, observed the night sky and never missed any astronomical event. In the park of his small Château de La Muette, his optics and physics laboratory had the largest existing telescope in the world. He sought out the company of scientists: the astronomers Cassini II and his son Cassini de Thury, the Lemonnier brothers, one an astronomer and the other a doctor-botanist, the surgeon La Peyronie, and among the courtiers, the Duc d'Ayen, the Duc de Croÿ and the Duc de Chaulnes. The latter above all was a famous scientist, the inventor of measuring instruments. The art collections of Louis XV no longer held paintings, sculptures or precious stones but scientific instruments of which the Passemant clock was the finest treasure.

23. Passemant's astronomical clock (detail), 1749-1753

24. Pneumatic machine of the Abbé Nollet, 1750-1755

25. Microscope given by Louis XV to King Stanislas, Alexis Magny, 1751

26. Louis XVI giving his Instructions to Captain La Pérouse on 29 June 1785, Nicolas André Monsiau, 1817

27. Passemant's Creation of the World clock, (detail), 1754

28. The Dulcimer Player, Peter Kintzing and David Roentgen, 1784



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## 6-2

### PRACTICAL SCIENTIFIC WORK AND COLLECTIONS OF LOUIS XVI

Louis XVI overtook his grandfather Louis XV in his scientific exploration. When one looks at the inventory of his private laboratories drawn up during the Revolution, the image of the "locksmith king" is seen to be a caricature. His practical devotion to science, and above all techniques, aside from his personal interest, reveals his determination to make the military, economic and industrial strength of the kingdom the greatest in Europe.

At Versailles, in the king's private apartment, the royal collections of scientific curiosities and instruments were continually enriched with new masterpieces: mechanical pieces of furniture, barometers, astronomical clocks, etc. A dining room was transformed into a conservatory of curiosities. Expert in naval matters, unlike Louis XV, Louis XVI collected scale models and construction plans of ships, as well as views of the ports of France, including Cherbourg, one of the great achievements of the reign. Expert also in cartography, the king corrected maps himself. After following the voyages of Captain Cook and their tragic end, he decided on and took part in the preparation of the scientific expedition of La Pérouse. Above his private apartment Louis XVI had ten laboratories, workshops and libraries, including a chemistry laboratory, a physics gallery where he carried out experiments in electricity, an artillery laboratory for studying new guns and canons, two rooms for his five lathes and a forge for his locksmith and carpentry workshops.

## 7

### VERSAILLES, PLACE OF SCIENTIFIC DEMONSTRATIONS

A scientist invited to make a presentation to the king and a demonstration in front of the Court achieved the supreme consecration, the equivalent of today's Nobel prize. The scientists also hoped that their devices would be purchased by the Crown, or taken on by manufacturers because all capital, held by both the royal Treasury and individuals, was concentrated in the Court.

Because of a widespread suspicion of charlatans and madmen, royal authorisation was not easy to obtain. Nevertheless, there were very frequent presentations made to the king, as attested in the *Gazette de France* and the *Journal des Savants*. The demonstrations before all the Court were rarer and more like science shows. They entertained and satisfied the curiosity for novelty; and they could also further the prestige of the kingdom.



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### EIGHT EXAMPLES OF PRESENTATIONS TO THE KING OR DEMONSTRATIONS BEFORE THE COURT

- The burning mirror presented by Vilette hoping to sell it to Louis XIV (1669);
- The electricity experiment orchestrated by the Abbé Nollet in 1746 in the Hall of Mirrors, a typical science show (1746);
- The *Creation of the World* clock presented to Louis XV to promote the fame of its inventor, Passemant, as it had already been sold (1754);
- The map of Cassini, to convince the King to raise the finance needed for its completion (1785);
- The manufacturing process of hard-paste porcelain, to promote the production of the Sevres manufactory (1769);
- The Dulcimer Player, acquired by the Queen as a curiosity, and finally donated to the Academy of Sciences owing to its scientific value (1784);
- Mesmer's "Tub", an example on the fringe of charlatanism (1781);
- Lastly, the Balloon of the Montgolfier brothers, the most celebrated of the demonstrations before the Court, which secured its inventors the support of the King and furthered the prestige of the kingdom because all the ambassadors of foreign countries attended (1783).

### ÉTABLISSEMENT PUBLIC DU MUSÉE ET DU DOMAINE NATIONAL DE VERSAILLES

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### OPENING TIMES

The Château is open every day except on Mondays and some public holidays, or when official ceremonies are held.

**Peak season:**  
9:00 am to 6:00 pm,  
last admission: 6:00 pm.

**Low season:**  
9:00 am to 5:30 pm,  
last admission: 5:00 pm

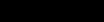
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CHATEAU DE VERSAILLES PRESENTS

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