

## The Istituto e Museo di Storia della Scienza, Florence: past and present

*Simone Contardi and Mara Miniati*

---

Arbor CLXIV, 647-648 (Noviembre-Diciembre 1999), 303-327 pp.

### **Origin of the collection**

To understand the origins of the Florentine Istituto e Museo di Storia della Scienza we need to go back in time to the scientific collection of the Medici family which was kept, for the most part, in the Uffizi Gallery <sup>1</sup>.

The Medicis, who governed Florence from the Fifteenth to the Eighteenth century, embellished the city not only with splendid palaces, but also with rich collections of art and other marvels which were kept in villas, in private apartments and, from the sixteenth century onwards, in the new Uffizi Gallery founded by Francesco I <sup>2</sup>.

Situated next to the Palazzo Vecchio, the Gallery was modified and enlarged over the years. It brought together both existing treasures and new acquisitions, including many of the wonderful items continually being imported from the New World.

One of its rooms, known as the «Hall of Mathematics», was reserved for the collection of scientific instruments: the ceiling and wall decorations of the hall comprised a number of cherubim holding up to view instruments identical to those kept in the room <sup>3</sup>.

The increasing number of the instruments meant that space eventually ran out and the collection had to be transferred to a larger hall in the west wing of the Gallery. The ceiling here represents an image of Mathematics surrounded by cherubim and shows scenes in which not

only sixteenth century instruments, but also new seventeenth century apparatus appear, such as, for example, the Galilean telescope. The hall was furnished with cupboards and cabinets in which the smaller instruments were kept, while instruments of larger dimensions, together with small statues, were placed on shelves <sup>4</sup>.

The walls were frescoed with maps. Instruments of even more substantial dimensions were placed on the floor, while the terrace at the end of the hall housed a large terrestrial globe and a Ptolemaic armillary sphere over three metres high.

This arrangement was maintained until the second half of the eighteenth century when the Gallery was transformed after the death of the last of the Medici family and the succession of the House of Lorraine to the government of the city.

### **The founding of the Royal Imperial Museum**

The Royal Imperial Museum (*L'imperiale e Regio Museo di Fisica e Storia Naturale*) was inaugurated on the 22<sup>nd</sup> February 1775 through a decree from Grand Duke Pietro Leopoldo after four years of massive restructuring of the old Torrigiani palace. The control of this new institution was entrusted to the physiologist Felice Fontana from Trento, known and valued by Pietro Leopoldo as a talented experimenter. A brilliant student of the mathematician Tartarotti, a follower of the German physiologist Haller during this period, by the end of the sixties Fontana had distinguished himself as an intelligent and fiery polemicist, openly pitting himself against Targioni Tozzetti—one of the pillars of Tuscan natural history—and, thereby, generating a climate of hostility towards himself <sup>5</sup>.

He shared the directorship of the institute with Giovanni Fabbroni, a young protégé of the grand duke and promising naturalist, who, before long, would become a protagonist in Tuscan scientific circles, in close contact with the exponents of the principal European institutions <sup>6</sup>.

Fontana gave the museum not only his untiring passion, but also endowed it with many of the convictions that he held regarding the tasks and the aims that science should set for itself. These convictions emerged clearly during the preparation of the rooms of the Museum, displaying how the Florentine institute was governed following precise scientific concepts.

The first months of work within the museum were dedicated almost entirely to the construction of instruments to be placed in the physics laboratory. Fontana attempted to recruit competent and experienced workmen who were able to construct scientific instruments with sufficient precision.

Nevertheless, he was greatly disappointed by the lack of technical competence available within the grand duchy and resorted to training his own young apprentices, becoming personally involved in the design of many instruments.

Paramount among the principal sources which Fontana and his artisans consulted to gain ideas for the reproduction of instrumental apparatus for Physics were the manuals of Nollet and 'sGravesande. The drawings of the experimental machines were an indispensable element in the communication of knowledge and functioned as a theoretical base for the job of constructing the instruments and for increasing technical knowledge.

At the root of so much enthusiastic fervour for constructing and using experimental apparatus, apart from the obvious need to endow the museum with new machines, was the strong conviction that ran like a thread through all of Fontana's activity; the affirmation and realisation of technical knowledge. Basing himself on the enlightened ideal of a form of knowledge that removes all fractures between theory and practice, between the study of nature and its technical application in service of the public and between the mind and the hand, Fontana was perfectly aware that all work undertaken along this path would not only represent a fundamental starting point for all further development of knowledge, but also for the development of the new figure, that of the artisan specialising in the production of instruments: a figure still unknown in Tuscany at the time, although flourishing in England and France.

Entering into this precise theoretical context are instruments such as the barometer, the thermometer and the anemometer, along with magnetic machines for dividing astronomical quadrants, which Fontana presented in the essay for the Real Gabinetto di Fisica e di Storia Naturale di Firenze, printed in Rome in 1775 to announce the recent opening of the Museum <sup>7</sup>. Nevertheless, the value of the publication did not end with this, albeit significant, list of instruments that had been constructed. The essay opened with the acclaim of Pietro Leopoldo as «provident and vigilant sovereign of Tuscany» to whose long-sightedness and benevolence was due the birth of an institution comparable in importance and beauty to the artistic richness accumulated by his predecessors in Florence:

If the Medici Family was given so much glory as to be made famous and immortal to posterity—the essay read—how much would the present day owe to Pietro Leopoldo who, with the aim of revitalising science in Tuscany, displayed his treasures to enlighten his people and to make them happy with their newly found knowledge? <sup>8</sup>

There is an obvious reference to a model of neo-maecenatism which, while inspired by the medicean tradition, significantly altered its aims and results.

Absorbed within a dimension tied to the dialect and taste of the Prince, medicean maecenatism found Pietro Leopoldo to be its natural proponent only in appearance. The work of patronage of the «useful arts» acquired value, in the intentions of the Grand Duke, only if directed towards public utilisation and eudemonism. The project for the public museum therefore mirrored the benevolence of the grand duke towards his subjects, putting them in a position to directly substantiate the technical achievements which that century had accomplished and also intended to affirm a scientific model which delved into technique and became an instrument of public utility.

The idea of turning the Royal Museum into a genuine centre of technical and scientific competence able to guide the planned interventions of the Tuscan court in the country needed an adequate laboratory structure.

At the beginning of the 1780s, upon Fontana's return from a visit to London and Paris, and following reconnaissance in the workshops of the instrument constructors in London's Fleet Street, Fontana and Fabbroni markedly accelerated the production of machines and instruments for the physics and chemistry laboratories. While the mineral and biological collections remained substantially unchanged, the number of instruments was almost doubled in just three years. Another programme that was recovered was the setting up of lightning rods in various regions of Tuscany to protect important public buildings. This had been originally started in the 1770s but soon abandoned. Fontana had proposed equipping some of the buildings in the grand duchy with electrical conductors to test their efficiency<sup>9</sup>. It was this that was the first concrete project that was elaborated within the Royal Museum that was aimed at evaluating research for its public utilisation.

The sustained effort by Fontana and his collaborators to construct a collection of wax models of the human anatomy was extraordinary. Despite the difficulty found in training specialised workmen, Fontana managed, in the course of the 1770s and 80s, to prepare six rooms of the museum entirely dedicated to wax models of the anatomy. Osteology was complemented with examples of the anatomy of the eye, nose and heart, and the collection also included three life-size statues. Such an important work carried out by Fontana and his assistants, among whom we should especially remember Clemente Susini, perfectly represents the didactic vocation that the museum sought to attain from its inception. Apart from

the outstanding collection of anatomical waxes, Fontana conceived the project of building models of the human anatomy in wood. The idea of constructing an anatomical statue in wood, where the organs were mobile and could replace the individual anatomical wax exhibits matured at the end of the 1780s. Numerous attempts were made, from 1788 onwards, by the museum's modellers who, however, experienced considerable difficulties. It is worth remembering, however, that one of the three statues that was built at the museum was requested by Napoleon Bonaparte and sent to Paris in January, 1806.

Again, at the beginning of the 1780s, a series of experimental programmes was planned regarding animal respiration, the quality of the air (this last experiment carried out with the 'evaerometro' invented by Fontana himself) and the systematic gathering of meteorological data. The director believed it was necessary to create an Academy of Art, flanking the museum, so as to bring together the best engineers in Tuscany. A project for the founding of an academy was drawn up by Fontana in 1782 but the Grand Duke, after initial hesitation, opposed it decisively, fearing the formation of a body which would be rigidly deployed in a corporate defence of its own privileges<sup>10</sup>. The affair concerning the founding of an academy was the first significant setback to the idea of making the museum an authentic «House of Solomon».

### Visibility and self-teaching

The feverish, unending, and often confused initiatives that characterised the institution in the early 1780s went hand in hand with the preparation of the museum rooms. The organisation of the rooms was managed by Fontana himself and structured according to a precise and determinate concept of what the museum should be.

«Given that an establishment», Fontana affirmed in a document from the first half of the 1780s, «that contains in its vastness all that natural science can embrace, must be destined for public use», then, «it needs to be such that, and organised in such a way so that everyone, according to his knowledge, can draw all the advantages and knowledge that suits his personal style of study and interests<sup>11</sup>.» The visitor must be enabled to follow a clear and definite route through the museum but also be able to pause in those rooms which are of more interest to him. The layout of the items for the most part followed the need to create a path that resembled as closely as possible the image of nature. The visitor, in fact, began his route on the first floor, visiting the Tuscan mineral exhibits —the primary elements of nature— which were exhibited next to the chemistry laboratory. Two ro-

oms on the first floor led to the entrance into the natural kingdom, which continued throughout the entire second floor where exhibits from the animal and vegetable kingdoms were displayed. The visit concluded at the stairs which were intended to lead to the observatory, inaccessible to the public due to the continuing construction work. The visit therefore went from the prime elements to the edge of the macro-cosmos passing through all the natural kingdoms. The global image of the naturalism collections, sustained by Fontana, clearly emerges in the various «Memories» published in the early years of the construction of the Royal Museum. The image of a House of Science, that allowed you to find —under a single roof— the representation of all the branches scientific knowledge, was further stressed, thus underlining its eminently practical character.

If, for science, such order for things and places is so necessary, it is equally easy —Fontana argued— and useful for the Sovereign and the City, for Tuscany, to view a grandiose and surprising composition which easily outstrips anything that has been previously constructed in other places and countries which, divided into many parts, would be easily equalled or bettered in time <sup>12</sup>.

The strength of the museum lay in its unity, in the capacity to gather under a single roof all the technical knowledge and theories that were available; the very collections, once broken up and separated would have lost their function. Fontana showed reluctance at every proposal to dismember the collections. It was this insistence, tinged by the illuminist enthusiasm towards the encyclopaedic ideal of knowledge, that represented one of the reasons for the split with his brilliant young pupil Fabbroni. Such a perspective eventually clashed with the position held by Fabbroni, becoming one of the main grounds of disagreement between the two naturalists. The occasion was offered by the construction of observatory, which Fontana had decided to locate on the small tower of the museum. The composition and purpose of the observatory saw two irreconcilable concepts of the museum confront each other <sup>13</sup>.

Fabbroni openly accused Fontana of wanting to nominate his friend and fellow townsman Giuseppe Slop as the museum's astronomer. The strongest criticism, however, that Fabbroni made of Fontana concerned the actual location of the observatory. Fabbroni showed a much more pragmatic mentality and clearly stated that it was practically impossible to conduct observations from the small tower and that it was preferable to move the observatory to the hill at Boboli, «This hill», wrote Fabbroni some years later, «removed from the museum, made Fontana not want to

assent to my wishes <sup>14</sup>». Fabbroni had realised by now that the choices made by Fontana no longer responded to the criteria of efficiency and rationality which were necessary for the direction of the scientific work in progress. Fontana's refusal marked the beginning of the conflict between the two naturalists. Furthermore Fontana remained highly loyal to his original concept of the museum. The collections had to remain together; the resources formed by nature and the human mind had to be admired within a single location.

The end of Fontana's great dream of constructing an institution that was both a centre for experiments and a visible manifestation of the sciences came in 1789 when Grand Duke Pietro Leopoldo bitterly recorded the tangible failure of such a project. Fontana had increased out of all proportion the number of objects in the Royal Museum and was no longer able to control the activities of its staff. Moreover, many of the planned research projects had failed to get off the ground. At the start of 1789, after 10 years of hard work, Fontana had to admit that by and large anarchy reigned in the museum and that many of the initiatives undertaken had turned the museum into a large workshop in a continuous state of preparation. It was this position that pushed Pietro Leopoldo to remove Fontana from effective control of the institute and entrust it to Fabbroni who was much more in tune with the needs of the court. There is no doubt that Fontana's experience ended in failure and this in turn marred everything he had built. No discovery of value was made during Fontana's directorship, none of the projects for intervening within the territory was brought to a successful conclusion, nor did he manage to groom a new generation of experimental physicians and naturalists in the museum who could make the Royal Museum fulfil the aims for which it had been founded. Nevertheless, the Florentine Museum increased people's awareness of science and its utility. It also helped a resurgence of the image of Tuscany in European scientific circles. And it is in the newly acquired role that Tuscan science obtained in the last decades of the 1700s in the European scientific scene that one can find the value of the intellectual life of a «foreign» naturalist who tied his name, and his fame as a naturalist, to one of the most ambitious of scientific undertakings.

### **The interregnum of Fabbroni and the directorship of Girolamo de'Bardi**

During the early years of the 19th century, Fabbroni tried to give new life to the academic vocation of the Museum. In 1801, during the French occupation, a scientific academy was established in the Museum's premises.

The Nuova Accademia del Cimento, inspired by the experience of the previous century, was short-lived and failed to produce any significant results. Fabbroni resumed the original project, even if in a completely different political context, and created two new chairs: botany and anatomy, granting the first to O. Targioni Tozzetti and the second to the surgeon Filippo Uccelli. Fabbroni's aim was to establish «an additional support to our universities»<sup>15</sup>. The Regio Museo was a collection of cultural heritage to be protected and developed as a symbol of the country's tradition and historical identity.

After Fontana's removal and the renewal of the workforce at the museum, the contribution of Giuseppe Raddi became more and more tangible (he was very close to Fabbroni and became one of his most reliable collaborators). However, the numerous commitments taken on by Fabbroni during the early years of the nineteenth century and the duties he had assumed as director of the Real Zecca (Royal Mint), hindered any real development of the Regio Museo activities at that time.

Even though he had planned to institutionalise an Experimental Physics Chair, similar to the one at the Muséum in Paris, and a chair in Astronomy, his expectations were frustrated. On February 27th of 1807 acting in «*motu proprio*» the regent Maria Luisa di Borbone, Queen of Etruria, opened the museum for public teaching, which was Fabbroni's great aim, but he was not to be the one to direct it. In fact he was removed from his appointment just ten days before the *motu proprio*, and the honours and burdens of the directorship were taken over by the Florentine nobleman Girolamo de'Bardi<sup>16</sup>.

Bardi was a man who had strong ties with the court and, removed from the mentality of his predecessors, he had been nominated thanks to his friendship with naturalists and scientists like Ottaviano Targioni Tozzetti, Paolo Mascagni, enemies of Fabbroni, but most of all due to recommendations made to the Queen in his favour by the Pagliacci sisters.

Bardi soon prepared a project for the organization of a «school» within the Museum and also drew up a list of candidates for the chairs. The new subjects were thus distributed: for Astronomy the designated professor was the abbot Domenico De Vecchi, for Theory-Experimental Physics abbot Giovanni Babbini, for Chemistry Giuseppe Gazzeri, for Comparative Anatomy Filippo Uccelli, for Mineralogy, Zoology and Botany Attilio Zucagni (who was immediately substituted by Filippo Nesti), for Mineralogy and Zoology Ottaviano Targioni Tozzetti.

On several occasions Bardi tried to make the Museum the main centre of Tuscan science. In 1808 the Florentine nobleman's project was realised: the new courses were attended by an increasing number of students and the professors were ready to publish their lectures in the *Annals of Physics*



and Natural History of the Museum. Bardi himself published a *Prospectus* for the progress of the Physical Sciences in Tuscany, which was a sort of panorama of the Tuscan scientific glories of the fourteenth and fifteenth century. The instrumental value of such an operation was to make his own work within the illustrious Tuscan scientific tradition stand out<sup>17</sup>.

Nevertheless, the growth of the Museum came to a sudden halt shortly after. The tight budget hit the salaries of the employees hardest, and they carried out their tasks with ever less enthusiasm and motivation. The constant contacts with France through the strong ties Bardi had with many scientists and naturalists there eventually brought to light the substantial difference in the understanding of the social role played by science and scientists in France and Tuscany. In spite of Bardi's efforts, the Museum largely stagnated.

Once the Napoleonic experience had ended, Bardi found himself in the uncomfortable situation of having to wait for events to unfold in order to know the fate of both the Museum and also his own career.

When Ferdinando III returned to the Tuscan throne at the end of April 1814, the restored authorities began to operate on the structure of the State of Tuscany. As for the Museum, the status quo was immediately re-established. The Liceo was closed and the professors were scattered among other institutions, thereby considerably reducing its role and prestige. In 1814-1815 this fragmentation brought about the dispersal of a good part of the collection of anatomical and naturalist waxes in favour of the Santa Maria Nuova and Innocenti Hospitals, sanctioning the final loss of the academic function of the Museum. Bardi kept his position, but was forced to accept that the scientific enterprise he had planned was becoming just a collectionistic model, without any interest in scientific research and the practical utilisation of discoveries.

### **The directorship of Vincenzo Antinori**

With Leopoldo II on the throne of Tuscany in 1824, new expectations were generated. Thanks to the sovereign's strong interest in science the observatory was reopened. But this remained an isolated initiative. The grand duke was not interested in the museum and Bardi's enterprise was coming to an end. The director died in February 1829.

Vincenzo Antinori was appointed director of the museum and gave new momentum to the institution<sup>18</sup>. Meanwhile, during the 1820s and the early 1830s, three important figures dominated the scene: Giovan Battista Amici, Leopoldo Nobili and Filippo Parlatore. The first one had been called in 1831, to substitute Jean Louis Pons as director of the Ob-

servatory. Since he was an expert astronomer and inventor of microscopes, we owe to him the restoration of the observatory and the building of the «cupolino mobile». Even in the field of optics, Amici distinguished himself. Nobili for his part, contributed to the growth of the physics collections. He enlarged the physics laboratory with new machines and decided to arrange them in the Museum's rooms according to historical criteria, thus making the most of those instruments which were now useless for research and academia. Nobili made regular meteorological observations and participated with Amici in the restoration of the Observatory. The lessons which Nobili held in the Museum, after the Grand duke had instituted the physics chair, were particularly relevant.

There was doubting in the fact that Leopoldo II was greatly encouraged by the cultural environment then present in Tuscany. Certainly the most prestigious figure both for competence and scientific rigour was Filippo Parlatore. His extraordinary career took him from Bourbonic Palermo, via the Museum of Florence, to become one of the highest scientific authorities of united Italy. He was a great botanist, and always maintained close ties to the ruling dynasty while it reigned in Tuscany. His work at the Museum became well known through the organization of the naturalism collections. In the years when Antinori and Parlatore managed the Florentine institution, they tried to train young physicists and naturalists who could build up their competence within the Museum, therefore reinforcing the academic and training areas. The physics and natural history collections were systematically inventoried and considerably enlarged. Thus, the Museum was recovering a role for itself and once again performing an important function in the Tuscan and Italian scientific context. In fact, it was thanks to the initiative of Antinori that the third Congress of Italian Scientists was held in Florence in 1841. On that occasion the Galileo Tribune was built, a sort of «temple» to honour the Pisan scientist and the glories of ancient science: instruments from the Medici collections and the Galileo relics found their placement here.

At this point the history of the Museum's links to the Lorraine dynasty came to an end. The second war of independence in 1859 sanctioned the entry of Tuscany into the new political reality of a united Italy. On June 24th 1859 a Royal decree established the authority of the Ministry of Public Education over the Museum.

### **From the Museo d'antichi strumenti to the Museo di storia della scienza**

After the foundation of the new Italian State in the second half of the Nineteenth century an old Lorenese institution such as the *Museo di Fi-*

*sica e Storia Naturale* was out of fashion and so it was almost abandoned. From the viewpoint of the new cultural attitudes it seems misleading to gather the whole scientific patrimony in one place. Mixing art and science in one collection came to be looked upon as an outmoded legacy of Renaissance and Baroque *Wunderkammern*.

This change of attitude is confirmed by the foundation of the *Istituto di Studi superiori* in Florence. In accordance with the modern idea of the specialisation of knowledge, it was divided in different sections each corresponding to a different scientific discipline, thus paving the way for the faculties of the future University of Florence. Each section was supplied with books, historical and modern apparatus and study material.

Thus, the scientific collection and the Medicean-Lorenese library were split up and the «glorious relics» of the past, the scientific instruments and the eighteenth century physics machines, remained in the same *Museo della Specola* building, which was converted into a zoological museum and a centre for natural science research.

The *Tribuna di Galileo* was now a forgotten monument in which the ancient machines and instruments gathered dust.

The directors of this part of the museum, which was called Museo d'antichi strumenti, —particularly Ferdinando Meucci (1823-1893) and Antonio Roiti (1843-1921)— tried to draw attention to the importance of the preservation of scientific instruments<sup>19</sup>. In 1895 Roiti acquired the objects which Vincenzo Viviani had bequeathed to the hospital of *Santa Maria Nuova* in 1703: among these were instruments, printed books and manuscripts which had once belonged to Galileo Galilei. In 1875 Meucci restored the big armillary sphere constructed by Antonio Santucci in 1593, and acquired a precious ancient Arabic globe dated 1080<sup>20</sup>.

Despite the efforts of the directors, the Florentine scientific collection was still neglected by both the public and the authorities. If this could happen to the most famous historical collection of scientific instruments, it is easy to imagine the fate of the Italian scientific patrimony as a whole, often forgotten abandoned in cellars, or even simply destroyed.

Only at the beginning of the 20th century did things begin to change. In 1924, the review *Archivio di storia della scienza*, founded and directed by Aldo Mieli, published Andrea Corsini's paper «Per il patrimonio storico-scientifico nazionale»<sup>21</sup>. He denounced the conditions in which the country's scientific patrimony was mouldering, drew the attention of the scientific community to it and thereby started an important movement. Andrea Corsini (1875-1961), a doctor and professor of anatomy, gave a substantial boost to the development of a new attitude toward the conser-

vation of scientific instruments. He organised the new *Gruppo per la tutela del patrimonio scientifico nazionale* (Florence, 1923), with the collaboration of the physician Antonio Garbasso (1871-1933), Prince Piero Ginori Conti, the director of the Royal Galleries, Giovanni Poggi, and others<sup>22</sup>.

The Florentine Group was strongly supported by Antonio Garbasso, at that time director of the *Museo di antichi strumenti* and director of the *Institute of Physics*, who succeeded in creating an institute devoted to the history of science. This institute was housed by the *Institute of pathological anatomy* of the Florentine University and received its collection of surgical instruments from the Hospital of *Santa Maria Nuova*. It had also portraits of scientists, a few books and financial resources.

Increasing care was devoted to the exhibition of its collections in order to draw attention to the institute, which obtained legal recognition in 1927<sup>23</sup>. The examples of the Deutsches Museum in München and the Science Museum in London helped to make the Florentine dream more realistic and concrete.

The legal recognition of the «Istituto di storia delle scienze» raised the status of the exhibition. An inquiry into the existing scientific patrimony was promoted, so as to enable the participation of ministries, museums, religious institutions and private collectors: the outcome of this was the organisation of a major exhibition, which, in consonance with the nationalistic attitudes of the thirties, was expected to give historical evidence of the Italian genius in the field of scientific and technical creation.

The research revealed the existence of a major stock of valuable material, despite the poor attention it had received.

The First National Exhibition of the history of science opened on 1929 May 8<sup>24</sup> and went on until the autumn. It was a great success. Among the objects on show were a number of instruments and machines dating back to the time of the rule of the Medicis and the House of Lorraine. When the exhibition closed the old Florentine instruments were not moved back to the Specola, but were transferred to the former seat of the National Library, the Palazzo Castellani, located in piazza dei Giudici.

The *Institute for the history of the sciences* was transformed into the *Institute and museum*. Andrea Corsini became its first Director and Piero Ginori Conti its President. It was inaugurated by prime minister Benito Mussolini on 1930 May 18, just one year after the exhibition. Outside there was a sign on which the museum was called «national»: vigorous action by the Florentine group had achieved the goal of causing general (more precisely «national») interest in its enterprise<sup>25</sup>.

At the beginning, the exhibition filled the ground floor and the first floor of the building. The second floor hosted the Accademia della Crusca.

After the outbreak of World War II the bridges were destroyed and some of the machines were damaged by vibrations. Everything was packed and protected, but not everything survived.

Worse still, in 1966 November 4th, there was a sudden and powerful flood at a time when the machines were completely unprotected. The Director, Maria Luisa Righini Bonelli (1917-1981), who lived in a small apartment on the ground floor, saved herself and some precious instruments, such as the Galilean telescopes and lens and the Arabic celestial globe, by jumping from the first floor to the adjacent window of the *Archivio di Stato* <sup>26</sup>.

Luckily, many people helped to repair machines, wax anatomical models, surgical instruments and so on <sup>27</sup>.

The *Accademia della Crusca* moved to another building and the exhibits took over the second floor, where all restored instruments and machines were arranged. In the 70s the new exhibition opened. *The Officine Galileo* built a planetarium where astronomy lessons began to be given <sup>28</sup>.

### **The Istituto e Museo di Storia della Scienza and its organisation**

Today, the Florentine *Istituto e Museo di Storia della Scienza* is an important institution with relationships with scholars and museums all over the world.

It occupies all four floors of the building, with exhibits on the first and second floors <sup>29</sup>.

The collection of instruments includes almost 5000 original pieces, some of which are on show and the remainder in storage.

The oldest instruments can be seen on the first floor (11 rooms). Renaissance mathematical instruments of all types are exhibited in the showcases of the first three rooms: astrolabes from Medieval Age until the Seventeenth century, the 1080 celestial globe, sundials and nocturnals, quadrants and graphometres. These instruments reveal the Medicis' strong interest in scientific collecting and confirm the importance assumed in these centuries by the activity of producing tools for measurements and observations. However, many of these instruments were not originally intended for use but for the admiration of their aesthetic qualities, like a painting, a piece of sculpture or artistic treasures in general.

The most precious instruments among the Renaissance collection are those belonging to two groups. The first group is made up of German instruments purchased by Mattias de' Medici (1613-1667), absolutely beautiful and precise quadrants, astrolabes, theodolites, and so on, signed by the most important German instrument-makers of the European *Wun-*

*derkammern*: the Schisslers, Thobias Volckmer, Georg Zorn, the Habermels<sup>30</sup>. The second comprises early English precision instruments from the legacy of Robert Dudley (1573-1649), Duke of Northumberland, who lived in Tuscany, worked for the Medicis and left his patrimony to the Grand Duke<sup>31</sup>.

Many of the instruments are made from precious materials, such as gold, ivory, gilded brass, and silver. The engravings and the decorations are elegant, as befits a prince's collection.

These are instruments to admire but not to use, true *objets d'art*, not only made outside Italy, but also locally: like those signed by Egnatio Danti (1536-1586) and Baldassarre Lanci (died 1571), which are of exceptional aesthetic value. Renaissance man invented and developed instruments of all shapes and forms to measure both the heavens and the earth, thus expressing the range of his philosophical and scientific conceptions. And even when the purpose of the instruments is aesthetic rather than practical, they testify, like their «real» counterparts, to the widespread interest of Renaissance and Baroque culture in the natural sciences.

A new kind of collecting begins in the fourth room: important and new instruments, like the Galilean devices, the ivory framed broken lens (the frame is dated 1677), the jovilabe, and the sector (1606). The room illustrates «some basic aspects of the extraordinary intellectual adventure of Galileo (1564-1642)»: eighteenth-century experimental apparatus to understand Galileo's research on mechanics, a nineteenth-century model showing the application of the pendulum to regulate the motion of clock mechanisms.

Two original telescopes are on show, the only ones surviving from those constructed in Galileo's own workshop. There are also telescopes covered in paper or leather built by Evangelista Torricelli (1608-1647), Eustachio Divini (1620-1685), Giuseppe Campani (1635-1715) and other Seventeenth century opticians. The optical apparatus are prisms and lenses, models of the eye and anamorphoses from the 16th and 17th centuries, constructed by the artist Ludovico Buti (1593), and by Jean François Nicéron (1642).

The imposing armillary sphere, made in 1593 by Antonio Santucci, and the collection of celestial and terrestrial globes are masterpieces of the art of cartography and astronomical constructions: Santucci was a cosmographer and «maestro di sfera» and built his monument to the Ptolemaic system in five years. The globes are signed by the most important makers of the years between 16th and 18th centuries: Janz Willem Blaeuw, Mattaeus Greuter, Vincenzo Coronelli, Guillaume de L'Isle etc.

The collection of microscopes shows the development of this instrument, from the first «occhialino», invented by Galileo, to the instruments of the nineteenth century invented and used by Giovan Battista Amici and Filippo Pacini in microscopic research <sup>32</sup>.

One particularly important section is that devoted to the *Accademia del Cimento*: scientific glasses and apparatus, such as thermometers and hydrometers, «blown» in the Boboli Garden between 1657 and 1667. This Florentine Academy was set in the *Pitti Palace*, under the protection and «tastes» of the Grand Duke Ferdinando II. At the end they published the *Saggi di naturali esperienze* (1667) <sup>33</sup>. The instruments preserved in the museum are an extraordinary example of the art of the Florentine glassblowers: the glasses are highly refined and delicate.

In another room it is possible to see the origin of meteorological instruments: thermometers developed in different countries, and barometers, hygrometers and anemometers of the Seventeenth and Eighteenth centuries. In particular, the collection includes the balance barometer invented in 1860 by Father Filippo Cecchi, director of the Osservatorio Ximeniano, for the city of Florence, placed under the *Loggia dell'Orcagna* and removed in 1940 <sup>34</sup>.

The second floor (10 rooms) is above all devoted to the Lorena collection. Some important Renaissance clocks and a collection of 25 watches recently presented to the museum by a private collector are, however, exhibited in the section devoted to the origin and development of the mechanical clock <sup>35</sup>.

Among the mathematical instruments of the 18th and 19th centuries, there are the dividing machines built in the Florentine Museum of physics in the second half of the 18th century following the model invented by the Duc de Chaulnes.

The most important section of the Lorraine period is that of the instruments of physics of the 18th and 19th centuries, which include spectacular electrical machines, portable instruments by Leopoldo Nobili (1784-1835), pneumatic and mechanic machines constructed in the workshop of the Museum of Physics or acquired in England, Germany or France <sup>36</sup>.

There are in this floor also the wax obstetrical models and the surgical boxes presented in 1927 by the hospital of *Santa Maria Nuova* to the new *Istituto di storia delle scienze*. Of the same provenance is the collection of pharmaceutical equipment: retorts, stills, flasks, baths of the 18th and 19th century.

The chemistry section comprises the chemical laboratory of Pietro Leopoldo. The Grand Duke was interested in analytical chemistry and

left his preparations and furniture to the museum of physics in 1790, when he went to Vienna to take the throne as Emperor of Austria.

The Museum is only a part of the life of the institution: we have an important library with more than 100,000 modern and ancient books, national and international specialised journals and very rare off-prints.

In recent years we have increased our computer section: now we are on the net (<http://www.imss.fi.it>) where our library catalogue, our research programmes, multimedia catalogue, publications and so on may be consulted. We organise important temporary exhibitions in Italy and abroad <sup>38</sup>, publish texts and series and the review *Nuncius*, which has been running for more than twenty years. Our budget is generous, but we need the help of private sponsors. At the moment the director is Paolo Galluzzi, an historian of science with a strong commitment to the museum's activity. He is a true manager, and although he receives no salary from the museum (the directorship is an honorary title!) he is immersed in its problems full time.

The staff of 21, with the help of contributors, fellows, volunteers, etc., works very hard on the production of publications, research, didactical activity, exhibitions, catalogues, and on the everyday running the institution, organisation of restoration and relationships with other institutions.

The museum is engaged in drawing the attention of a broad public to our scientific heritage and culture. We have created a form for cataloguing scientific historical instruments and technical apparatus <sup>39</sup> and are involved in a number of European projects highlighting the importance of our scientific heritage. The exhibitions always give the opportunity to show the importance of scientific culture and scientific instruments and apparatus to the public.

In conclusion, the *Florentine Istituto e Museo di Storia della Scienza* is a point of reference for scholars and amateurs of the history of science. Its laboratory for the application of the new technologies to the diffusion of scientific knowledge is involved in the production of CD, hypertext and multimedia applications <sup>40</sup>. In just few years, the institution, endowed with a collection of unequalled value, with a rich library, with a lively research activity, has transformed itself from a small, almost private museum to a true centre for scientific.

Now the problem is the ever present gap between our goals and the available financial and human resources, always less than we need.

## References

<sup>1</sup> The Uffizi Gallery was set up in 1581. Before, the collection occupied the rooms called «Guardaroba» in the Palazzo Vecchio. See: *Gli Uffizi, quattro secoli di una galleria*. Florence, 1983; *La città degli Uffizi*. Florence, 1982.



<sup>2</sup> About the Medicis and their collections, see: *Gli Uffizi. Storia e collezioni*. Florence, 1983.

<sup>3</sup> G. L'E. Turner, «Amorini scienziati» *Kos*, Anno I, n. 10, December, 1984.

<sup>4</sup> D. HEIKAMP, *La Galleria degli Uffizi descritta e disegnata*, in *Gli Uffizi, quattro secoli di una Galleria*, cit.

<sup>5</sup> An important figure in the scientific panorama in Europe in the 1700s, FELICE FONTANA (1730-1805) has been the subject of interest, especially in recent year, for students; of particular note are the studies by R. Mazzolini, *Il carteggio tra Charles Bonnet e Felice Fontana*, «Physis», XIV, 1972, 1, pp. 69-103; Id. *Dizionario Biografico degli Italiani ad vocem, F. Fontana, Carteggio con Leopoldo Caldani 1758-1794*, by R. MAZZOLINI and G. ONGARO, Trento, Società di Studi Trentini di Scienze Storiche, 1980; F. ABBRI, *Les Science de l'air. Studi su Felice Fontana*, Cosenza, Brenner, 1991; Id., *Le terre, l'acqua, le arie. La rivoluzione chimica del Settecento*, Bologna, Il Mulino, 1984, passim; W. BERNARDI, *Le metafisiche dell'embrione. Scienza della vita e filosofia da Malpighi a Spallanzani*, Firenze, Olschki, 1986, pp. 437-452; 465-478; Id., *I fluidi della vita. Alle origini della controversia sull'elettricità animale.*, Firenze, Olschki, 1992, especially pp.247-261; P. KNOEFEL, FELICE FONTANA. *The Life and Works*, Trento, Società di Studi Trentini di Scienze Storiche, 1984, Id., *Felice Fontana 1730-1805. An Annotated Bibliography*, Società di Studi Trentini di Scienze Storiche, 1980. G. Barsanti, *Introduzione a Felice Fontana. Ricerche filosofiche sopra la fisica animale*, Firenze, Giunti, 1996. On the role of Fontana as director of the Royal Museum and his links with the court in Tuscany, R. Pasta, *Scienza politica e rivoluzione. L'opera di Giovanni Fabbroni (1752-1882) intellettuale e funzionario al servizio dei Lorena Firenze*, Olschki, 1989, pp. 41-46 and 178-186. On the Florentine museum, U. SCHIFF, *Il Museo di Storia Naturale e la Facoltà Di Scienze Fisiche e Naturali di Firenze*, «Archeion», IX, 1928, pp. 88-95 and 290-324. For more information refer to S. Contardi, *Unità del sapere e pubblica utilità: Felice Fontana e le collezioni di fisica dell'Imperiale e Regio Museo di Firenze in La politica della scienza. Toscana e Stati italiani nel tardo settecento*, edited by G. BARSANTI, V. BECAGLI, R. PASTA, Firenze, Olschki, 1996, pp. 279-293; Id., *La Casa di Salomone a Firenze. Felice Fontana ed il gabinetto di fisica dell'Imperiale e Regio Museo (1775-1789)*. Thesis for PhD in History of Science. University Florence-Siena-Naples. Academic year 1995-1996, 3 voll.

<sup>6</sup> For Fabbroni, refer to the excellent work by R.PASTA, *Scienza politica rivoluzione*, op.cit.

<sup>7</sup> The essay was written by the abbot CERUTI, based on indications supplied by Fontana, in reality the actual author of the publication. Proof of this fact is contained in the history of the 1700s conserved in the Institute and Museum of the History of Science in Florence (IMSS) *Filza dei negozi per l'anno 1792*.

<sup>8</sup> *Saggio del Real Gabinetto di Fisica e di Storia Naturale di Firenze*, Roma, Zempel, 1775, p. 1.

<sup>9</sup> Cfr., F. ABBRI, *La «spranga elettrica» Frisi e l'elettricità*, in *Ideologia e scienza nell'opera di Paolo Frisi (1728-1784)*, by Gennaro Barbarisi, Milano, Angeli, 1987, pp. 161-199.

<sup>10</sup> Cfr. S. CONTARDI, *La Casa di Salomone*, cit., pp. 248-279.

<sup>11</sup> Archivio di Stato di Firenze (ASF), Segreteria di Finanze, f. 479, cc. non num.

<sup>12</sup> Ibid.

<sup>13</sup> For the tormented story of the observatory, see M. Miniati, *Le origini della specola fiorentina*, «Giornale di astronomia», III, IV, 1984, pp. 209-220.

<sup>14</sup> Arezzo State Archive, Archivio Fossombroni, f. 4, letter from G. Fabbroni to V. Fossombroni, s 1. e.s.d.

<sup>15</sup> Cfr. R. PASTA, *Scienza Politica e rivoluzione*, cit., p. 494.

<sup>16</sup> Cfr. S. BONECHI, *Un proprietario toscano tra scienza, rivoluzione e filantropismo: Girolamo de' Bardi (1777-1829)*, «Nuncius. Annali di Storia della Scienza», X, 1995, pp. 51-97.

<sup>17</sup> *Annali del Museo Imperiale di Fisica e Storia Naturale di Firenze per l'anno MDCCCIX*, Firenze, Piatti, 1810. Cfr. S. BONECHI, *Un proprietario toscano*, cit., pp. 73-75.

<sup>18</sup> U. SCHIFF, *Il Museo di Storia Naturale*, cit., passim; G. BOFFITO, *Gli strumenti della scienza e la scienza degli strumenti*, Firenze, Libreria Internazionale Seeber, 1929; F. PARLATORE, *Mie Memorie*, Palermo Sellerio, 1992; M. L. RIGHINI BONELLI, I. Turci, *L'Istituto di fisica e scienze naturali*, op. cit.

<sup>19</sup> M.L. RIGHINI BONELLI, I. Truci *L'Istituto di fisica e scienze naturali di Firenze alla luce di nuovi documenti d'archivio*, in *Atti del I Congresso internazionale sulla ceroplastica nella scienza e nell'arte*, Firenze: L.S. Olschki, 1976.

<sup>20</sup> A. MEUCCI, *Il globo celeste arabo del secolo XI esistente nel Gabinetto degli strumenti antichi di astronomia, di fisica e di matematica nel R. Istituto di Studi superiori*. Firenze: coi tipi dei succ. Le Monnier, 1878; Id., *La sfera armillare di Tolomeo costruita da Antonio Santucci*. Firenze: Tip. del vocabolario, 1876.

<sup>21</sup> A. CORSINI, «Per il patrimonio storico-scientifico italiano», *Archivio di storia della scienza*, vol.V, (1924), pp. 348-355.

<sup>22</sup> See G. BARONCELLI, M. BUCCIANINI, «Per una storia delle istituzioni storico-scientifiche in Italia: l'Istituto e Museo di Storia della Scienza di Firenze», *Nuncius. Annali di storia della scienza*, V, fasc. 2, (1990).

<sup>23</sup> *The review Archivio di storia della scienza became Archeion: archivio di storia della scienza from 1928*. It was the official «voice» of this new institute and of the Florentine Group.

<sup>24</sup> *Guida della prima Esposizione nazionale di storia della scienza: Firenze, maggio-ottobre 1929-VII, Palazzo delle Esposizioni, Parterre di S. Gallo*, Firenze, Ente per le attività toscane, 1929; *1.a Esposizione nazionale di storia delle scienze, Firenze, maggio-ottobre 1929: catalogo con aggiornamenti*, Firenze, L.S. Olschki, 1952.

<sup>25</sup> G. BARONCELLI, M. BUCCIANINI, «Per una storia...» cit, p. 37.

<sup>26</sup> P. FRANCESCHINI, «L'alluvione su Firenze del 4 novembre 1966 e il Museo di storia della scienza», *Physis*, vol. 8, fasc.4, (1966); M.L. RIGHINI BONELLI, «L'alluvione di Firenze e il Museo di storia della scienza», *Coelum*, vol. 35, n°. 1-2, (1967).

<sup>27</sup> L. BELLONI, *Lo strumentario chirurgico di Giovanni Alessandro Brambilla dopo il ripristino dai danni dell'alluvione del 4 novembre 1966*, Firenze, Istituto e Museo di Storia della Scienza, 1971; M. MINIATI, «L'Istituto e Museo di Storia della Scienza a Firenze a 20 anni dall'alluvione», *Atti della Società Leonardo da Vinci*, 1987.

<sup>28</sup> The first planetarium was changed and enlarged in time. It is still working. See M. FELLI, B. MONSIGNORI FOSSI, *Lezioni di astronomia tenute presso il planetario dell'istituto e Museo di storia della scienza di Firenze*, Print out, 1987; B. MONSIGNORI FOSSI, A. RIGHINI, *Astronomia al planetario di Firenze*, Firenze, Edizioni Polistampa, 1993.

<sup>29</sup> *Catalogo degli strumenti del Museo di storia della scienza*. Firenze, Olschki, 1954; M.L. RIGHINI BONELLI, *IL MUSEO DI STORIA DELLA SCIENZA*. Milano, Electa, 1968; M.C. CANTÙ, M.L. RIGHINI BONELLI, *Gli strumenti antichi al Museo di storia della scienza di Firenze*, Firenze, Arnaud, 1980; *Museo di storia della scienza. Catalogo*, a cura di M. Miniati. Firenze, Giunti, 1991.

<sup>30</sup> E. ZINNER, *Astronomische Instrumente des 11. Bis 18. Jahrhunderts*. München, 1956; M. BOBINGER, *Alt-Augsburger Kompassmacher*, Augsburg, 1966.

<sup>31</sup> J. TEMPLE LEADER, *Vita di Roberto Dudley, duca di Nortumbria*. Firenze: Tip. di G. Barbera, 1896.

<sup>32</sup> G. L'E. TURNER, *Catalogue of microscopes*, Firenze, Giunti, 1991. This is the first volume of the Museum scientific catalogues.

<sup>33</sup> W.E.K. MIDDLETON, *The experimenters: a study of the Accademia del Cimento*, Baltimore, The Johns Hopkins University press, 1971; M.C. CANTÙ, M.L. RIGHINI BONELLI, *The Accademia del Cimento*, Florence, Nardini, 1970; P. GALLUZZI, «L'Accademia del Cimento: "gusti" del Principe, filosofia e ideologia dell'esperimento», *Quaderni storici*, 48, (1981).

<sup>34</sup> P. BRENNI, «Il barometro ritrovato», *Nuncius. Annali di storia della scienza*, IX, fasc. 2, (1994).

<sup>35</sup> See L. PIPPA, *Orologi della collezione Ruscitti*, Firenze, Giunti, 1998. This volume is the third of the series of museum catalogues dedicated to Italian private and public scientific collections.

<sup>36</sup> P. BRENNI, *Catalogue of mechanical instruments*, Firenze, Giunti, 1993; W. D. HACKMANN, *Catalogue of pneumatical, magnetical and electrical instruments*, Firenze, Giunti, 1995.

<sup>37</sup> A. ZANCA, *Le cere e le terrecotte ostetriche del Museo di storia della scienza di Firenze*, Firenze, Arnaud, 1981.

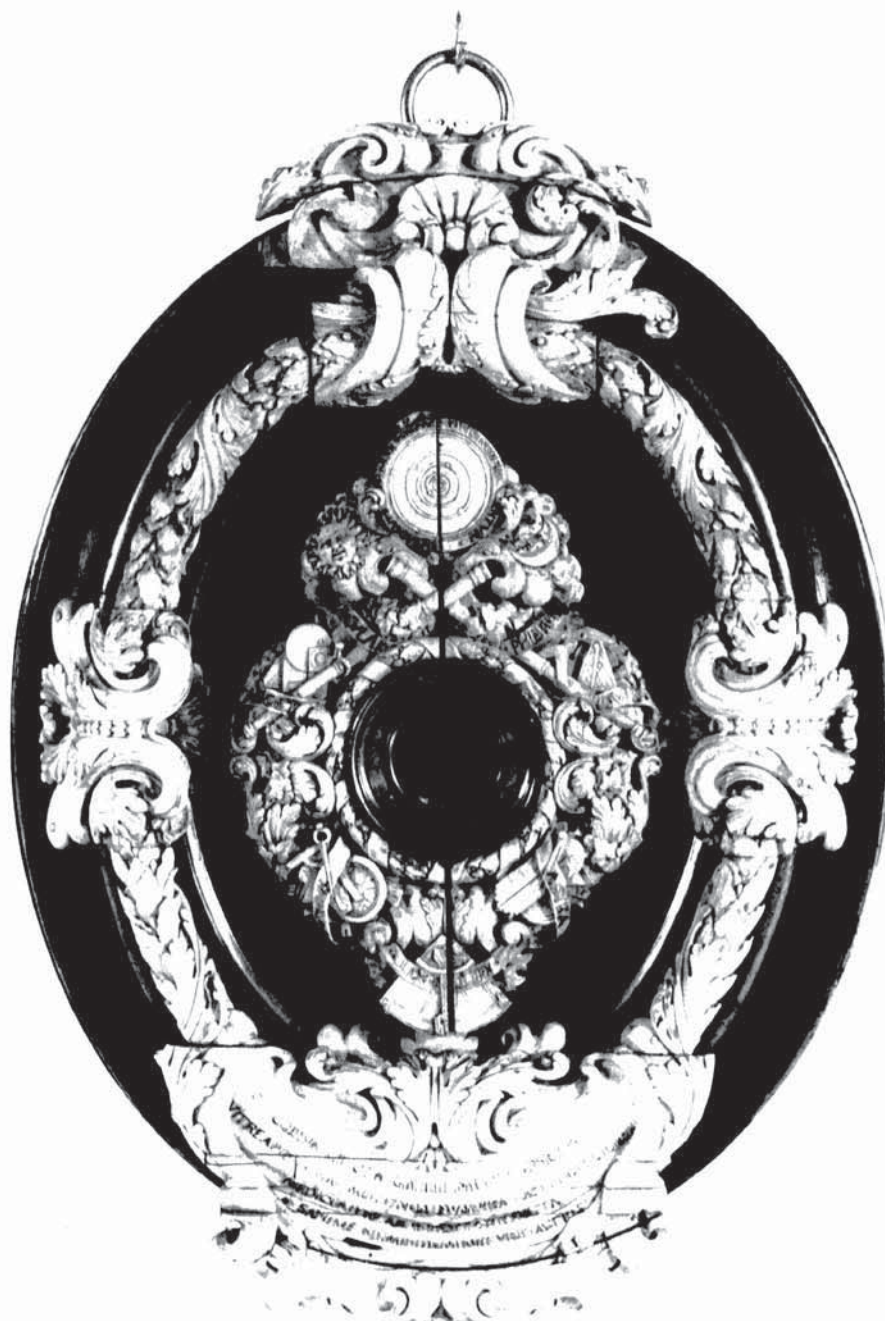
<sup>38</sup> Last examples: the exhibitions «Renaissance engineers», «Mechanical marvels», «Homo Faber», which were in different countries. Their catalogues are published in different languages. There are CD which show these exhibitions: they were produced in the computer laboratory of the Museum

<sup>39</sup> M. BERNI et al., «SIC, Un programma per la catalogazione degli strumenti scientifici», *Nuncius. Annali di storia della scienza*, VIII, (1993), fasc. 2; F. GUIDI, M. MINIATI, *Catalogazione informatica proposta dall'Istituto e Museo di Storia della Scienza di Firenze: la scheda SIC*, in *Strumentazione storico-scientifica in Liguria*, Recco, Regione Liguria, Comune di Genova, Università di Genova, 1996.

<sup>40</sup> About the «philosophy» and the possibilities of the modern technologies, see P. GALLUZZI, P.A. VALENTINO (eds), *I formati della memoria: beni culturali e nuove tecnologie alle soglie del terzo millennio*, Firenze, Giunti, 1997.



*ISTITUTO E MUSEO DI STORIA DELLA SCIENZA DI FIRENZE (photocolor di Franca Principe)*



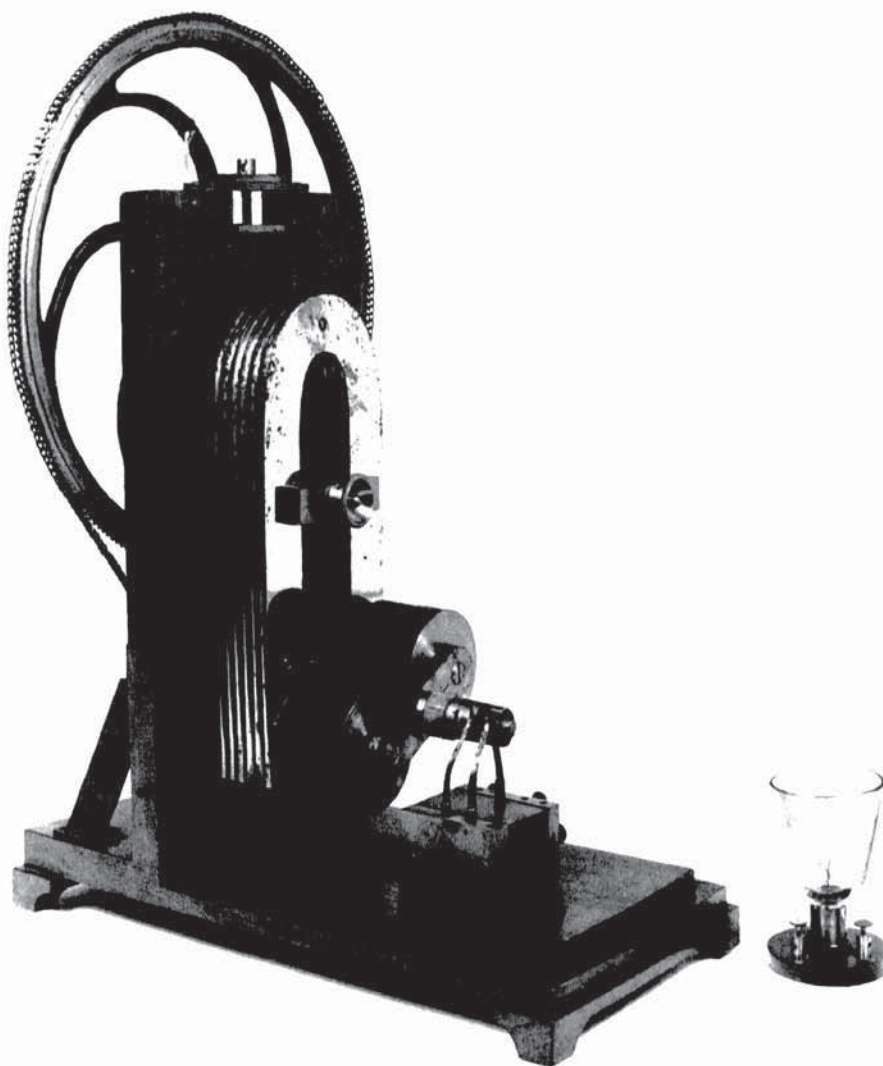
*ISTITUTO E MUSEO DI STORIA DELLA SCIENZA DI FIRENZE (fotografia di Franca Principe)*



*ISTITUTO E MUSEO DI STORIA DELLA SCIENZA DI FIRENZE (fotografia di Franca Principe)*



ISTITUTO E MUSEO DI STORIA DELLA SCIENZA DI FIRENZE (fotografia di Franca Principe)



*ISTITUTO E MUSEO DI STORIA DELLA SCIENZA DI FIRENZE (fotografia di Franca Principe)*





*ISTITUTO E MUSEO DI STORIA DELLA SCIENZA DI FIRENZE (fotografia di Franca Principe)*