

The 'Ferreira da Silva' Chemistry Laboratory: a valuable asset in a university collection

MARISA MONTEIRO & LUIS BERNARDO

Abstract

The relevant scientific and teaching activity in chemistry the Polytechnic Academy of Porto was involved in, at the turn of the 19th century, led to the decision of assigning a significant area of a building under construction for a new analytic chemistry laboratory.

Several reasons are given why the Museum of Science has been proposing that this laboratory, a superb example of the University of Porto's heritage, named after the prestigious chemist and Professor Ferreira da Silva, should be considered an item in itself in the museum's overall collection, for its various valences, restored to its most valuable architecture and so preserved, to be appreciated also as a privileged exhibit scenario for the scientific instrument collection.

The beginnings of the teaching of chemistry

The teaching of chemistry in Porto goes back to the days of the Royal Academy of Navigation and Commerce (Academia Real de Marinha e Commercio). This academy was founded in 1803, in the aftermath of the success attained by two earlier classes, Nautical Class (the Aula Náutica, 1762) and Sketching and Drawing Class (the Aula de Debuxo e Desenho, 1779). It was run by the General Company of the Agriculture of the Upper Douro's Vineyards (Companhia Geral da Agricultura das Vinhas do Alto Douro) – a highly privileged and powerful guild of Porto wine producers and merchants, created in the mid-18th century – and financially supported by taxation on the consumption of wine in the district. Agriculture was one of the courses to be given by the Royal Academy from the very start, though its actual debut occurred only in 1818 (BASTO 1937). The syllabus comprised botany, to which basic notions of chemistry seem to have been associated, as inferred from the notes published in 1827 by the senior lecturer, Agostinho Albano da Silveira Pinto (1785–1852), *Primeiras linhas de chimica e botanica, coordenadas para uso dos que frequentam a aula de agricultura da real academia de marinha e commercio (Elements of chemistry and botany for the use of those attending the course of agriculture in the royal academy of navigation and commerce)*.

Yet, chemistry as an independent subject emerged only out of the profound educational reform that the country went through in 1837. High schools were created in every district's major town, a Polytechnic School was founded in the capital, and Porto's already decadent Royal Academy was replaced by the Polytechnic Academy.

The Polytechnic Academy offered for attendance eleven different subjects, where the ninth was "chemistry and chemical arts". The prolific romantic-early realistic writer Camillo Castello Branco, who produced quite a number of vivid and often humorous chronicles on Portuguese life for half a century, left us a short account of the chemistry classes he himself attended at the academy (1866, 245):

"It was twenty two years ago! [...] I was studying Chemistry at the Academy in Porto. I only remember well two of my schoolfellows: one of them was the best student in class; the other one, who came last in the list, would be the worst student, if I myself was not there. [...] Our lecturer, Father Joaquim de Santa Clara de Sousa Pinto, never had the pleasure of listening to us. When he summoned us, either we could not be seen, or we had not seen the compendium, which by the way was called *Lasagne*, I think. I would not bet on the spelling. We retreated from class crouching, when God's sun drove us to rebellion. How sadly I saw the sunlight and envied my life left behind in the mountains, from where I came to study the iron sesquioxide and the sodium bicarbonate in those cold rooms of Graça convent!"

Camillo was reporting to events that took place in 1845, most probably to chemistry lectures given in a conventional room, as a chemistry laboratory was practically non-existent in those days, though the 1837 reform act had ruled its creation. The Graça Convent was (and had been for decades) the site of the Royal College of Orphan Boys, shared from the beginning of the nineteenth century with the Royal Academy of Navigation and Commerce. The premises stood as a block of houses with different ages, packed together and filling an irregular pentagon-shaped area, surrounded by the outer walls of this earlier academy, whose construction was frequently hindered on the grounds of insufficient funding. Until the end of the century, this would be the overall appearance of the Polytechnic Academy.

The first chemistry laboratory came into existence by 1844: It was a 9.2m long, 2.5m wide corridor adjoining the chemistry class, deprived of apparatus and utensils, simple and compound substances, as reported by Manoel Nepomuceno, former student and preparer at the academy between 1859 and 1877 (FERREIRA DA SILVA 1893). According to his account, the laboratory had little more than some melting ovens, with air admitted by big blacksmith's bellows; a few glass flasks and retorts; some tin plate alembics; one pneumatic trough; one large wooden mortar, a few others in bronze, iron and marble; and some jars containing substances. José António de Aguiar (1812–1850), appointed substitute chemistry lecturer in 1839, often paid for reagents and glassware to perform demonstrations, out of his own pocket.

In 1852, an Industrial School was created and lodged in the same unfinished building. The common usage of the chemistry laboratory (as well as of the physics cabinet), decreed not long after the foundation of this school, would contribute, though not immediately, to the improvement of the laboratory's conditions. By 1864, the same year the Industrial School was turned into the Industrial Institute of Porto (nowadays the Instituto Superior de Engenharia), the chemistry laboratory was reportedly (ABREU 1865) an irregularly shaped room at the first floor, whose location has not yet been identified; merely 4.3m high, with wooden floor and plaster ceiling, it was completely inadequate for either industrial chemistry preparations or delicate experiments and analyses. The chemical manipulations were thus limited to the repeated extraction of some gases and preparation of some alloys.

The role of Ferreira da Silva

A breakthrough took place in 1868, when an area in the eastern wing, at ground level, previously occupied by shops whose profit was intended to support the orphans, was transformed into two adjoining laboratories, for the Polytechnic Academy and the Industrial Institute, to a certain extent following the installation model described by Bobierre (BOBIERRE 1844; FERREIRA DA SILVA 1893).

A character then came into scene, who would decisively shape chemistry in Portugal, and particularly in Porto, in the last quarter of the 19th century, and through the first decades of the 20th century: António Joaquim Ferreira da Silva (seen in the photograph at fig. 1 as a young man among his peers).

Born in 1853, Ferreira da Silva graduated in the University of Coimbra and was appointed substitute lecturer for the Natural Philosophy Section at the Polytechnic Academy when he was 24. He would teach chemistry all his life, in the academy and later in the faculties of science, pharmacy and medicine of the University of Porto.

Shortly after his admittance, he initiated a systematic program – extending for years, as reported by successive academy's yearbooks – of acquisition of apparatus and instruments, utensils, reagents, and mineral and organic samples, while gradually altering the laboratory's furniture and appliances.

He also set up the Laboratório Municipal de Química do Porto in 1884, supported by the Town Hall and inspired on the Laboratoire Municipal de Chimie de Paris, to control public hygiene conditions and



Fig. 1 - Some of the Polytechnic Academy's lecturers in the academic year of 1880–81: Ferreira da Silva is the young man standing on the right. Photo: Courtesy of the Chemistry Department of the Faculty of Science

biochemistry in Portugal, and José Pereira Salgado, who would become rector of the University of Porto, Ferreira da Silva created, in 1905, *the Revista de Chimica Pura e Applicada (Journal of Pure and Applied Chemistry)*. He also co-founded the Portuguese Chemistry Society (1911).

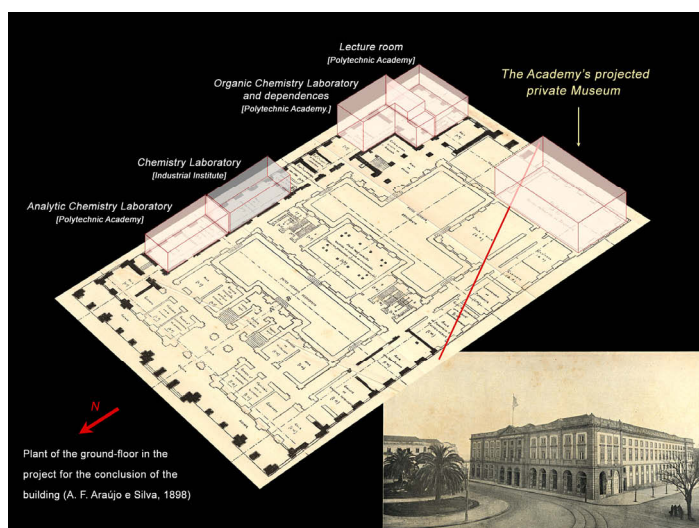


Fig. 2 - Areas occupied by the chemistry laboratory at the turn of the 19th century, along the eastern wing of the academy's building. Inset is an image of the building, after completion. Photo: *Anuário da Faculdade de Ciências, 1911–12 a 1913–14*

Birth and life of a laboratory

According to this project, the 22m long, 11m wide room at the Southwestern corner – formed as the building's implantation area changed from a pentagon to a rectangle – was to accommodate the academy's private museum (ARAÚJO E SILVA 1898), for the display of models representing remarkable national inventions, either as a project or that had actually gone into operation. However, at some stage, a choice was made to turn it into a new analytic chemistry laboratory, taking advantage of its more than 6m height.

prevent food fraud. It would be enlarged in 1889, and a photometry office would be added, to watch over the quality of lighting gas. Well equipped and in possession of an exceptional library, the laboratory became a truly practical school of chemistry for those working in it. This facility was closed down in 1916, despite the accusations of funding misuse moved against Ferreira da Silva were dropped, following a 10-year judicial process.

Together with his closest collaborators, Alberto d'Aguiar, who himself directed a successful private laboratory and is considered a pioneer of research in

Ferreira da Silva was a tireless and methodical worker, who built an international reputation in analytical chemistry and toxicology, contributing writings on these subjects and also on pedagogy, ethics and religion, as well as chemistry textbooks.

The areas of the academy that were already occupied by the chemistry laboratory in the late 1890s, as a direct consequence of Ferreira da Silva's research and teaching achievements, can be seen in fig. 2; the plant shown relates to a project dating from 1898, intended to complete the building (the straight line indicates where the façades of the earlier constructions had been).

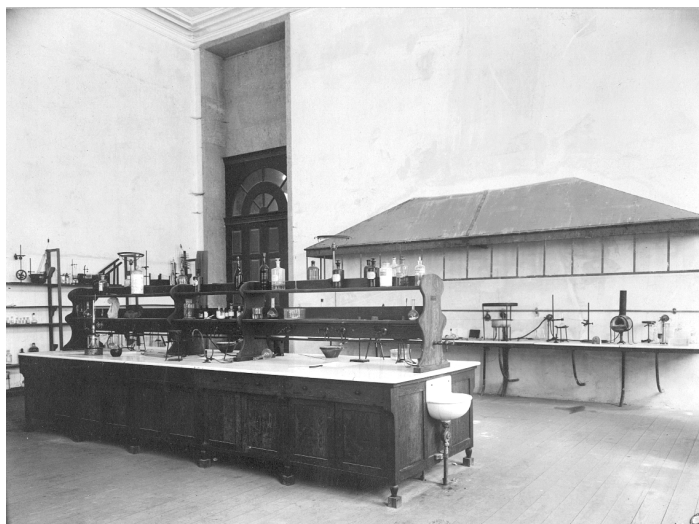


Fig. 3 - View of the large fume cupboard, c. 1920. Photo: Domingos Pinto, Photographia Ideal, Porto (Archive of the Museum of Science)

The delivery note of the tabletops for the work benches, kept in the Museum of Science's document holdings, helps to establish when the decision may have been taken: these tabletops, made of enamel lava stone from Volvic (a chemically very inert material), were shipped from Paris in the last day of 1912. The laboratory's grandeur, somehow conveyed by its impressive height, can be appreciated in this view of the large fume cupboard against the large fume cupboard against the eastern wall, still existing today (fig. 3).

In December 1922, the analytic chemistry laboratory was renamed after Ferreira da Silva, as a tribute to the chemist. He was unable to attend the

ceremony, as his wife had died a few days before. He himself would die a few months later. The homage further comprised the unveiling of a bust by the renowned Portuguese sculptor Teixeira Lopes, and the renaming of the street running along the building of the Faculty of Science (which replaced the Polytechnic Academy in 1911, with the foundation of the University of Porto).

José Pereira Salgado (1873–1946), who had been one of Ferreira da Silva's closest collaborators, took over the direction of the chemistry laboratory. The ongoing struggle for space would lead to the refurbishment of the now 'Ferreira da Silva' Laboratory, in order to accommodate classes of qualitative and quantitative chemical analysis: in 1927, a mezzanine was built all around, with a wrought-iron balcony (fig. 4). A double staircase connected the two laboratories thus formed. Divisions made with glass panes, some of them colored green, created reserved areas, for an office, and for small cabinets designed for the storage of glass utensils and operation of analytic balances.



Fig. 4 - The 'Ferreira da Silva' Laboratory c. 1930: eastward and westward views. Photo: Photographia Ideal, Porto (Archive of the Museum of Science)

In the 1940s, again out of lack of space, the mezzanine was demolished, and the ceiling was lowered in order to have rooms added at the intermediate level thus created. The laboratory was used until 1996, when the present departments of physics and chemistry moved to new facilities. It was then

entrusted to the newly founded Museum of Science, and is now the museum's main storage room, regrettably not accessible to visitors.

The 'Ferreira da Silva' Laboratory: What next?

Attention has been drawn already to the fact that Portugal seems to be a privileged country in the European scenery, as far as historical laboratories are concerned. As Lourenço & Carneiro have stated (2006, 63),

“though they have been naturally degraded by usage, and suffered modifications through time, three examples of chemistry laboratories can be found in our country, one from the 18th century (in Coimbra), one from the 19th century (in Lisbon, being quite large and having survived almost intact), and one from the early 20th century (the Laboratory 'Ferreira da Silva' in Porto, presently integrating the Museum of Science of the Faculty of Science)”.

This circumstance has been considered, by these authors, “to be an unique opportunity for interpreting and communicating almost the whole of Chemistry, as well as an invaluable source for research” (LOURENÇO & CARNEIRO 2006, 64).

The Museum of Science has, from its very start, endeavored to preserve the 'Ferreira da Silva' Laboratory, and plans to have it restored to the period of its most appreciated architecture, between 1927 and 1949. We have sufficient information – in scattered pieces of furniture that have been found and sizeable photographs held by the Museum – to allow for the faithful reconstruction of the laboratory, as it was in the nineteen thirties and forties. None of the original fittings, such as the large work benches and fume cupboards, has been destroyed in the past interventions, thus, the aspiration to restore the laboratory's Art Déco style merely adds aesthetical value and does not downgrade its scientific functionality.

The collection of chemistry instruments is still poorly studied, at this stage. It can be said, however, that it is the result of the systematic purchasing of instruments, reagents, utensils, etc., by Ferreira da Silva, for over 20 years; the addition of the holdings of the Laboratorio Municipal, after its closure, in 1916; and, finally, the elimination of many instruments bought before 1940, in the 1960s. Dramatic as this may sound, it is still a significant collection. The collection of physics instruments held by the Museum of Science, having not been subject to this cleansing action, is much larger. Both collections await adequate conditions to be put on exhibit.

Conclusion

The 'Ferreira da Silva' Laboratory is, recognizably, a unique example of an early 20th century teaching chemistry laboratory to be found in Portugal, its original fittings remaining relatively untouched, though having been used by generations of students and twice subject to major architectural modifications. As far as cultural/scientific tourism is concerned, its restoration would provide an opportunity – for national and international visitors – to come into touch with historical laboratories from the three oldest universities in the country, built at different times in the timeline of chemical teaching and research, and framed by the characteristic conditions of each institution. Furthermore, being Portugal such a small country, these laboratories happen to be confined to a 300-kilometer distance tour. This sort of experience may no longer be possible in some countries where the urge for intellectual and technological production, combined with resource and space management, led to the irreversible alteration or utter disappearance of laboratorial infrastructures considered obsolete.

The building housing the 'Ferreira da Silva' Laboratory belongs, historically, to the Faculty of Science, whose departments have gradually moved out, between 1996 and 2008, as the university grew larger. The decision was then taken to hand over this building, the most significant one in the history of the

university, to the rectory, to be shared with the National History and Science Museums, both created in 1996, and with the university's archives and ancient holdings library. Over the past years, the memory of laboratories and theatre rooms alike has been erased, as these interiors have been refurbished in accordance with its newer bureaucratic functions. As it is, the laboratory's fittings are the only indoor infrastructures left, which are reminiscent of the early days of the Faculty of Science.

Moreover, as we tried to show through the history unfolded above, the decision for setting up this laboratory in a significant part of the building of the Polytechnic Academy, when it was finally completed after a delay of several decades, emerged as a consequence of the research and teaching activities in chemistry which were then held in Porto, by the hand of the distinguished chemist Ferreira da Silva. Chemistry was considered to be cutting-edge science at the turn of the nineteenth century, while Ferreira da Silva was one of our most respected scientists at the time, as well as a competent teacher, which necessarily ought to be valued by any university.

The character of Ferreira da Silva is also evocative of the relationship between the university and the community. His field of expertise – analytic chemistry and toxicology – had direct application in common people's prized goods such as health and hygiene. The creation of a chemistry laboratory in a town with severe hygiene conditions by the end of the 19th century, to watch over the quality of food, water and lighting gas, is an example of civic awareness – still relevant today – given by both Ferreira da Silva and contemporary City Hall authorities. The Laboratório Municipal de Química no longer exists: it lives, however, through objects still existing in the chemistry instrument collection, and through a laboratory that came to light in the wake of the recognition of the importance of analytic chemistry in citizens' lives, and consequently, in the background the university was expected to provide to prospective chemists.

Last but not least, it is intended that selected items from the chemistry and physics instrument collections integrate a permanent exhibition in dedicated space, picked out from the areas already assigned to the Museum of Science. If the University of Porto is fortunate enough to have a chemistry laboratory with its earliest fittings still present, we believe that the scenario for this permanent display should be a historically and scientifically meaningful space such as the 'Ferreira da Silva' Laboratory, as opposed to any general-purpose, uncharacteristic space. The intrinsic value of this laboratory, though seemingly centered on the life and deeds of one person, yet, under a more attentive eye, deriving from the ability to offer multiple interpretations, then adds to the value of the collection.

Literature cited

- ABREU, J. M. DE 1865. *Relatório da Inspeção Extraordinária feita á Academia Polytechnica do Porto em 1864 pelo Vogal Efectivo do Conselho Geral de Instrução Publica*. Lisboa: Imprensa Nacional.
- ARAÚJO E SILVA, A. F. DE 1898. Projecto da conclusão do edificio da Academia Polytechnica do Porto: Memoria descriptiva. In: *Anuario da Academia Polytechnica do Porto, Anno Lectivo de 1901–1902* (Coimbra: Imprensa da Universidade), 213–222.
- BASTO, ARTUR DE M. 1937. *Memória Histórica da Academia Politécnica do Pôrto*. Porto: Imprensa Portuguesa.
- BOBIERRE, AD. 1844. *Traité de Manipulations Chimiques*. Paris: Méquignon-Marvis Fils.
- CASTELLO BRANCO, C. 1866. Meu condiscipulo. In: *Cavar em ruinas*, ed. CASTELLO BRANCO (Lisboa: Livrarias de Campos Júnior), 245–252.
- FERREIRA DA SILVA, A. J. 1893. *Breve noticia sobre o ensino da chimica na Academia Polytechnica do Porto e sobre os regulamentos do laboratorio e dos trabalhos praticos dos alumnos: apresentada ao Congresso Pedagogico de Madrid (Outubro de 1892) a pedido do Conselheiro Bernardino Machado*. Porto: Typ. Occidental.

LOURENÇO, M. C. & A. CARNEIRO 2006. A propósito do Laboratório Químico do Museu de Ciência da Universidade de Lisboa: algumas reflexões sobre o património científico em Portugal. *Boletim da Sociedade Portuguesa de Química* 103: 63–70.

Contact

Marisa Monteiro

Curator, Museu de Ciência da Universidade do Porto / núcleo FCUP

Address: Pr. Gomes Teixeira, 4099-002 Porto, Portugal

E-mail: mmonteiro@reit.up.pt

sigarra.up.pt/fcup/web_page.inicial

Luis Bernardo

Professor; Director, Museu de Ciência da Universidade do Porto / núcleo FCUP

Address: Pr. Gomes Teixeira, 4099-002 Porto, Portugal

E-mail: lbbernar@fc.up.pt

