Correlation between instrument collection and archive sources of the Faculty of Physics of the University of Barcelona

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Abstract

The collection of scientific instruments for teaching and research of the Faculty of Physics of the University of Barcelona is under study to increase the information and knowledge of each item. The main sources of information are related to text books and external sources such as databases, catalogues, other collections and museums, etc. But one of the most important sources of information about the origin and function of the instruments is present in the university itself, in the libraries and in the various archives.

This paper illustrates, with examples, some strategies used for obtaining more information about several items of the collection.

Introduction

The Faculty of Physics of the University of Barcelona has a significant collection of scientific instruments for teaching and research accumulated over more than one hundred and fifty years. It is a relatively recent collection, its recovery having been initiated in the 90s (VALLMITJANA 2011).

In order to acquire good knowledge and information of the whole collection of scientific instruments, a series of questions arise; for example, what is their purpose, function, provenance, manufacturer and how are they to be stored, conserved and restored. The answers to all these questions are usually to be found in different archives and sections in the university: in the libraries, archives of inventories, records of meetings, agreements, agendas, records of the official teachers, records of purchases and invoices, records of syllabus, courses and time-tables, etc.

Obviously there are other very valuable external sources of consultation, such as other university libraries, collections, museums, databases, and it is especially useful to consult these entities through the internet, but the present work focuses on internal sources. In this communication various information sources at the University of Barcelona are described with some examples, all related to the data acquisition process for the collection of scientific instruments of the Faculty of Physics.

Main source of information: Text books

One of the most important sources of information about the function of the instruments is present in the libraries of the universities, particularly in text books. Physics text books very often provide good information that describe devices illustrating various principles of physics.

The Group of Libraries of the University of Barcelona has built up a huge collection of different documentation organized in a catalogue with access to all the available documents in the libraries (books, magazines, multimedia and electronic resources, sound recordings, videos, etc.) and to a collection of important old and rare books (CRAI).

Concerning our collection the most suitable books are those associated to scientific content.

Physics text books

Particular to scientific instruments, the ideal books related to physics, experimental physics, and scientific instruments are in the library of the physics and chemistry faculty (CRAI).

We have looked at physics books between the years 1825 to 1935 and an initial list of 359 books was compiled. After a work of filtering and selecting, a new more useful list has been reduced to 35 items.

For example, we have the text books of Jean-Baptiste Biot (1774–1862), François-Sulpice Beudant (1787–1850), Pierre-Adolphe Daguin (1814–1884), Nicolas Deguin (1809–1860), César Despretz (1798–1863), Charles Drion (1827–1863), Émile Fernet (1829–1905), René-Just Hauy (1743–1822), Jules Jamin (1818–1852), Gabriel Lamé (1795–1881), Antoine Libes (1752–1832), Jean-Claude Péclet (1793–1857), Claude Pouillet (1790–1868) but perhaps the most useful and best known is the Adolphe Ganot (1804–1887) *Traite Elementaire de Physique Experimentale et Appliquée et Meterologie* appeared for the first time in 1851, with more than 20 editions in France (SIMON 2011). This book has also been translated into Spanish by José Monlau (1862), A. Sánchez de Bustamante (1870), and Eduardo Sánchez Pardo (1881).

It is also interesting to look at the textbooks written (or sometimes translated) by the same teachers who taught the subjects of physics and experimental physics in the university itself, as can be seen in below.

Catalogues

The scientific instrument catalogues are an important source of information, because they provide an easy means of identification as well as information about the manufacturer. They are especially important in the case of objects with missing parts and the identification of rare cases. Unfortunately there are few instrument catalogues in the archives of our university, but we have made good use of catalogues of other universities (SMITHSONIAN INSTITUTION; UPC), for instance.

The professors who teach physics subjects. Staff personal files

The analysis of textbooks written by professors of the university has also been of significant importance. In the archive unit of the University of Barcelona there is a section of personal files of the teachers who were on the teaching staff. Specifically in the nineteenth century, we can mention the following teachers who taught physics subjects in our university.

Pere Vieta Gibert (1778–1856) was teaching between 1808 and 1837 in the *Junta de Comerç, Escola de Física Experimental* (School of Experimental Physics of the Board of Commerce). In 1818 he translated the *Traité complet et élémentaire de physique* by Antoine Libes (1752–1832) He was professor at the University of Barcelona in the years 1838–1840 and later in 1845–1856. In 1840 he translated *Élements de physique experimental et météorologie* by Claude Pouillet (1790–1868) (Puig-PLA 2006, 544–546).

Antonio Rave Bergnes (1818–1883) taught physics and chemistry between 1846–1856 in the University of Barcelona and later, became professor 1857–1883. He made a very useful inventory consisting of a list of equipment and objects in the physics cabinet of the Faculty of Sciences in 1868, which is described later.

Bartolomé Feliu Pérez (1843–1918) was between 1880–1895 professor at the University of Barcelona. In 1878 he wrote *Curso de Física* (FELIU 1883).

Eduardo Lozano y Ponce de León (1844–1927) was professor at the University of Barcelona between 1884–1899. In 1893 he wrote *Elementos de Física* (LOZANO 1891).

Eduard Fontseré Riba (1870–1970) was professor at the University of Barcelona between 1900–1940. In 1911 he wrote *Elementos de ciencias físicas y naturales* (FONTSERÉ 1911).

Eduard Alcobé Arenas (1867–1945) was professor at the University of Barcelona between 1901–1937 and in 1925 wrote *Física General* (ALCOBÉ 1925).

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¹ Edited 15 times.

Other sources of information

Inventories

A great deal of information can be extracted from lists and inventories. In the general archives of the University of Barcelona, there is an inventory of the scientific instruments dated 1868, written by Professor Antonio Rave.²

The origin of this list is associated to an educational reform related to an attempt at standardization. In 1846, on 15 October, the minister of education Pedro José Pidal Carniado (1799–1865) published in the official gazette, a catalogue-model of the machines and instruments necessary for a chair of experimental physics. A set of 153 items with the price in FF from the catalogue of Lerebours and Pixii were described (SIMON, GARCIA-BELMAR & BERTOMEU-SÁNCHEZ 2005).

In our archives we have found a letter from another French instrument maker Jules Salleron (1829–1897), with a list of scientific instruments and their prices, sent to Antonio Rave, and another letter with the selected instruments ordered in 1864,³ as seen in fig. 1.



Fig. 1 - Letter of the instrument maker Salleron with selected instruments and prices ordered by Antonio Rave in 1864.

The next document related to this equipment is the aforementioned inventory of 377 items contained in a "List of equipment and objects in the Cabinet of Physics of the Faculty of Sciences" handwritten and signed by Professor Antonio Rave, on Barcelona, on June of 1868⁴ (see table 1).

The analysis of this list resulted in a study of the provenance of the present collection (Vallmitjana 2012). If we look at the coincidences or agreements between the elements of this 1868 inventory and the present collection, we find only 35 identified elements (and some of them with some uncertainty). The reason for this small number is clear, because the present collection has a large number of elements acquired later than 1868. Moreover, it is very likely that a good many of the old instruments have been lost, especially if we consider the changes of location of the university between 1842 and 1872, the lack of conservation protocols, etc.

A step forward in the study of the present collection was made by analyzing the makers of the scientific instruments. Among these 35 identified instruments from the 1868 list, 26 belong to unknown makers and only 9 to signed makers. Other conclusions were that the 1868 list agrees with the recommended list of 1846 and moreover, there was a marked increase in the number of items. Few instruments have been preserved to this day. Very few instruments from the 1868 list have been correctly identified. About half of those with no maker's signature were probably made by local makers.

² Archive of the University of Barcelona, document with reference ES CAT-AUB 02 25-2-7-4.

³ Archive of the University of Barcelona, document with reference ES CAT-AUB 02 25-3-5-4.

⁴ Archive of the University of Barcelona, document with reference ES CAT-AUB 02 25-2-7-4.

Contents of the 1868 inventory	
Fields	Items
Mechanics and gravity	26
Hydrostatics and hydrodynamics	34
Pneumatics	27
Capillarity and molecular actions	9
Dilation and thermology	20
Vapor and hygrometry	24
Heat radiant and conductivity	18
Heat and pyrogeny	11
Magnetism	10
Static electricity	50
Dynamic electricity	42
Optics	53
Acoustics	26
TOTAL	350
Glass containers and tools	27
TOTAL	377

Table 1 – Handwritten list of equipment and objects in the Cabinet of Physics of the Faculty of Sciences, signed by Professor Antonio Rave, in Barcelona, June 1868.

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Annual reports

In the general archive are preserved many annual reports, which describe the inaugural speech of the academic year, the statistics of students enrolled in each faculty and the students who have completed Bachelor's degrees. But more interesting is that some lists are also grouped by faculties, subjects and the teachers who taught them. These directories (some of them) are available between 1858 and 1977. For example, in the academic year 1865–1866 we can see how the aforementioned Antonio Rave taught experimental physics (DIPOSIT DIGITAL).



Fig. 2 - Record of exemption of customs duties for a Sartorius theodolite in the period 1905–1912.

Archives of purchases

There can also be found in the general archive, but only in the period from 1905 to 1912, purchase invoices and papers for customs exemptions. Looking at these files we have found a reference to a Sartorius theodolite of our collection, which contains the serial number, which has given us the exact date of entry, 7th July, 1913, as seen in fig. 2. Other examples concerning importers and local manufacturers could also be cited as complementary data for the study of the collection of scientific instruments.⁵

Documents of donations

The Faculty of Sciences has a large double refractor telescope with equatorial mount made by the French instrument maker Mailhat, with a 22 cm of aperture; it was donated. In the general archive we found a document explaining the details of the donation, how this telescope reached the faculty, the works of implementation of the instruments and the mounting of the dome in 1918 and the final document signed in 1923.⁶

Archives of faculty boards

In the reserve area of the library of the university, records of all meetings and faculty boards from 1876 are kept. The minutes of faculty boards record significant agreements that were made, so they are a very valuable source, because on several occasions decisions regarding the purchase of instruments for teaching or research are shown.

Thus, we can cite as an example the fact that in 1905 the Faculty of Sciences acquired an equatorial refractor telescope of 5-inch aperture from the Irish firm Grubb, and a faculty board of 13th May 1901 mentioned that Professor Tarazona thanked the university for the construction of a shed in the garden of the university, with a Repsold theodolite. Four years later the dome and the telescope were also mounted in the garden.

Another more modern example is found on December 11th, 1964, when the minutes cite that the first electron microscope had arrived at the Faculty of Sciences.

Other less orthodox sources of information

Conversations with colleagues

Oral information may also be a good source of information, such as in the following case, referring to a case of missing documents.

The above mentioned Grubb telescope was acquired through the initiative of Professor Ignacio Tarazona. Initially, there was no information about the purchase in the archives of the university. Thanks to comments with colleagues from the department of astronomy of our university, we found out that the department of astronomy at the University of Valencia has all the documentation of the purchase (an enlightening detail in this story is that Professor Tarazona moved to the University of Valencia in 1906).

This documentation contains more than 70 letters between Ignacio Tarazona and the instrument maker Howard Grubb during the period 1902–1905. The analysis of this documentation has permitted the reconstruction of the whole story.

It would appear that Dr Tarazona obtained the chair of cosmography and physics of the globe at the University of Barcelona in 1898, and promoted the acquisition of the Grubb telescope of 5 inches, a 4m diameter dome and associated accessories. These letters offer all kinds of details of a long and complicated process. For instance, the price was £252, the dome arrived in the summer of 1904 and the telescope arrived in the spring of 1905. He occupied this chair until 1906, when he returned to the University of Valencia, where he took possession of a chair also of cosmography and physics of the

⁵ ARCHIVE UB c. Archive of the University of Barcelona, document with reference ES CAT-AUB 02 26-5-6-20.

⁶ ARCHIVE UB d. Archive of the University of Barcelona, document with reference ES CAT-AUB 02 25-1-8-6.

globe. On his return to Valencia, he took with him all the documentation concerning the purchase of the telescope. More information about this professor appeared in 2008 in an excellent complete study about astronomy and astrophysics in Spain in the period 1850–1914 (RUIZ-CASTELL 2008, 92–98).

The paintings

The pictures and paintings that decorate various rooms of the university also reflect a good deal of information about the status of culture and society at different times. In particular, there are sometimes paintings of scientific instruments, and it is in connection with this that we come to the last example.

In the physics faculty there is a low-powered telescope with azimuth mount for training purposes signed by *Viuda de José Rosell, Barcelona* (Vda. Means widow). From other studies we have limited information on this company from Barcelona. Jose Rosell began in business in 1837, in Plaza Palacio 13 or 15. He died on an unknown date, but his widow maintained the optical workshop until 1905.

But in the largest room of the historic building there are several pictures, and in one that refers to an allegory of science, the telescope is clearly visible as shown in fig. 3. Because the architectural data and paintings are well documented, we know that the picture was painted by Joan Vicens Cots (1836–1885) between 1881 and 1883 (ALCOLEA 1980). This date helps to refine the dating of the telescope considered, so thanks to this painting we can improve on the dating of the instrument.



Fig. 3 - Picture in the *Paraninf (Largest Room)* by Joan Vicens Cots (1836–1885) dated between 1881–1883.



Fig. 4 - Telescope manufactured by Vda. J. Rosell, Barcelona.

Conclusions

We have seen through several examples, that we can expand the information on the collection of scientific instruments of Faculty of Physics by looking in the different sections of the archives and libraries of the University of Barcelona. However, there is not always a clear connection between these different sections and the searches are not always easy and the management is not agile enough. Although nowadays the archive

unit is performing a task of conversion of card records into digital records and a progressive scanning of documents, it would be useful to establish a review of the structure of the contents of the files and to create databases with different query retrieving keys leading to different sections.

A more general conclusion is focused on the importance of promoting the creation of databases and an appeal to different universities to be able to create affordable databases to exchange information between them. It would also be desirable to create unification of criteria and tools and a standardization of digital systems to make global information for museums and university collections possible in the future.

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