

Analysis, conservation and restoration of the metal threads used in Latin American colonial saints' robes

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Abstract

In this work we have analysed the silver and gold threads used for the decoration on the costumes of important religious sculpture from the colonial period and also one 19th C. statue of the Virgin Mary. Latin America had plenty of silver and gold mines not only during the colonial period but also in the 18th and 19th C. Silver and gold threads were frequently used in the embroidered decoration of the costumes adorning the most important, miraculous religious sculptures. The people of Latin America were very religious during that time.

This work presents the analyses and restoration on objects representative of three famous colonial sculpture schools in Latin America and the important school of Cataluña in Spain. The objects selected were:

Angel (school of Quito. Ecuador), *Saint Magdalena* and *Saint Frederick* (school of Cuzco, Peru) all from El Huique church,

a *Christ Child* and a *Textail (Pluvial)* (both from a school in Chile) from the Cathedral of Valdivia; and

a *Virgen del Carmen* from the patron of Santiago 19th C. Spanish school, Cataluña.

Keywords: Silver and gold thread, religious statuary, couching, over-use, rodent damage.

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1 Introduction

1.1 Some background concerning the history of mining in Chile:

Firstly, I would like to remind the reader that Chile is a country of great mining riches: particularly gold, silver and copper. During the Inca period, Chile was gave tribute to Perú in gold, which came from Marga-Marga. Extraction of gold from this source continued after the Spanish conquest. With the founding of La Serena in 1544, Concepción in 1550, La Imperial in 1551, Valdivia in 1552, and Osorno in 1554, the mineral pits and washeries of Andacollo, Quilacoya, Cautín, Madre de Dios and Ponzuelo were exploited respectively. The exploitation of the last four was terminated during the rebellion of the natives in 1959. The silver deposits, among others, Huantajaya, Copiapó and Huasco, in the North, Valdivia and El Chivato, in the central zone, have been exploited since the 13th century. These sites weresuperceded by the discovery of the silver in Azogue, in Punitaqui, from which the process of amalgamation was easier. The magnificent Casa de la Moneda, which is the current Palace of Government, was built in 1780 by Joaquín Toesca, and symbolizes the apogee of noble metal production along the 18th century.

The census of 1813 revealed the existence, between Copiapó and Talca, of 46 gold mines, 9 silver ones, 33 copper ones, one of lead, another one of quicksilver, 107 metal ore grinding mills, 27 silver-smelting blast furnaces for offerings of gold and silver and 52 casting machines. In the middle of the 19th century the mythical deposits of Chañarcillo and Arqueros would become the utmost as far as silver production was concerned. Their work throughout the colonial period has concentrated, not only in coin minting, but in objects for use in churches, for silverware for household use, and as well, for all kinds of objects (for example: fire-pans, tables, chairs, and even “small chamber pots”). It was a way, in

the absence of banks, to keep control of personal wealth.

After the analysis, the restoration of the “gold and silver“ threads was completed as they were separated from the costumes. We have to say that after the analysis we found out that the the silver and gold threads were not so pure a silver and gold as the History of Art says. It is the second time that I have worked with colonial objects and discovered that the quality of the metal is not good. So it appears that the Spanish people in Latin America sent the best gold and silver home, and sold a misrepresentation to the Indian people.

Damage to the objects in the country church of El Huique was caused by the attacks of mice. In the Cathedral of Santiago and the Cathedral of Valdivia the damage is because the people use the sculptures in different religious ceremonies, so the sculptures reveal damage because of overuse.

1.2 Museum of the Cathedral of Valdivia

In 1997, I (Johanna Maria Theile) designed the Museum of the Cathedral of Valdivia, where I worked with colonial silver and gold articles in the museum’s custody. I also restored threads used in the embroidery of the chasubles and robes of the statues of the Saints and of Baby Jesus.

As already mentioned, religious art had great importance and significance in convincing the indigenes about the Catholic religion and in trying to maintain the faith of the Spaniards. This situation existed not only in Santiago but in the provinces as well. Missions began to be founded in different parts of the country. The mission in Valdivia was followed later by others carried out by the Jesuit and Franciscan clergy. Religious celebrations and ceremonies were very important, as for example, when the Marquez of Macera in repopulating the city of Valdivia in 1645 ordered “you shall have to take great care in that every Easter, days of Our Lady, apostles and patriarchs, all kinds of celebrations; and that people go to confession at least on Easter and Holy Week, and on the days of Our Lady the Virgin”. To carry out these celebrations, the clergy made great efforts in order to endow all the churches with rich holy amphorae, liturgical ornaments, paintings and sculptures. They even created carving workshops using the cypress and laurel in Valdivia. Tradition dictated that the saints and the clergy had to be dressed in robes embroidered with gold or silver threads. We see these objects today in the museum.

On February 1st, 1552 Pedro de Valdivia founded the city of Valdivia and the construction of the first principal church called Santa María la Blanca, whose patron was the Virgin of the Rosary, was commenced. Then, in 1559 the Main Church was made in Cal y Canto at the main square. Why was this cathedral so important? Because they were under threat from a number of sources. In 1599 the principal church was destroyed by the Huilliches and Mapuches (native indians of the area) who attacked Valdivia. Reconstructed in 1647, as a Family Vicariate dependent from the Bishop’s See of Concepción, it eventually became too small, and another church was built in 1712. But in 1748 a fire destroyed it, and another one was built. In 1870 the mother church was damaged by a water spout, and in 1907 it was damaged by an earth tremor. It was again destroyed in 1960 by an earthquake.

In 1988 the decision was taken to build a new cathedral. After a public bidding awarded to Mr. Jorge Swimburn Pereira, Jorge Swimburn Ríos and Alvaro Pedraza the new cathedral was built during ten years.

A modern church was inaugurated on October 9th, 1998. It was, at that time, decided to build a museum at the church. The help of Father Guarda was requested in order to carry out the museological design and I was asked to carry out the montage, conservation and restoring of the pieces. A museum with environmental control display windows, rail lighting, air conditioning, alarms, etc was thus created.

2. Techniques

2.1 Museum display cabinet

The museological notes were made by Father Guarda and a great deal of the work was carried out by us in Santiago at the Benedictine monastery. In the museological work, I designed a display window to be as perfect as possible, with a firm base in order to balance 42 school children (number of students in a normal class in Chile) without it tipping over. It was made of black non-polluting polyethylene (analysed with the Oddy Test), with a false floor in order to produce the correct microclimate, dry, because the environment of Valdivia is very humid. Black is the predominant color in the museum, to enhance the displayed objects since not all of them were of great quality. Part of the collection was donated in Santiago and another we received in Valdivia.

2.2 At the Cathedral of Valdivia

2.2.1 Analysis, Conservation and Restoration of the Pieces.

Among the donations to the museum were various silver and gold objects which were generally in good condition. Only one large silver object made to hold communion hosts had a loose base. It was fixed with grey Poxipol (Chilean Akimet) and the marks left by the paste were painted with Rembrandt acrylic paint. The biggest problems concerned laying the objects made of cloth, all of which were religious attire belonging to the Cathedral. They were certainly used previously in processions. In case of a mitre, it was necessary to reinforce the back part of the textile because it was made of silk, which had become embrittled. This work was carried out with the couching technique. All the loose gold and silver threads were tightened with silk threads using curved surgical needles. This mitre was used by the bishops of Valdivia and it dates back to the 18th century.

In the case of a pluvial (Figure 1) embroidered with birds and flowers, not only colour but also silver and gold threads were used. Damage due to use may be observed in it. Tightening the loose threads and reinforcing the pluvial on the back with a linen cloth was necessary to effect the restoration. Since it is very beautiful, a special display window was made where it is shown at a 45-degree angle to keep it from being damaged again.



Figure 1. The pluvial

Because this pluvial of the Virgen del Carmen (18th century) was one of the oldest objects of the museum which had decorations made with silver and gold, the threads used in this work were submitted to scientific analysis. Figures 2(a) and 2(b) show scanning electron microscope images of a thread at different magnifications. Figure 2(c) shows an x-ray fluorescence spectrum of the metal. The principal component is silver. The existence of trace gold, tin, and iron is evidence of the relatively crude extraction process which preceded the drawing of the thread.

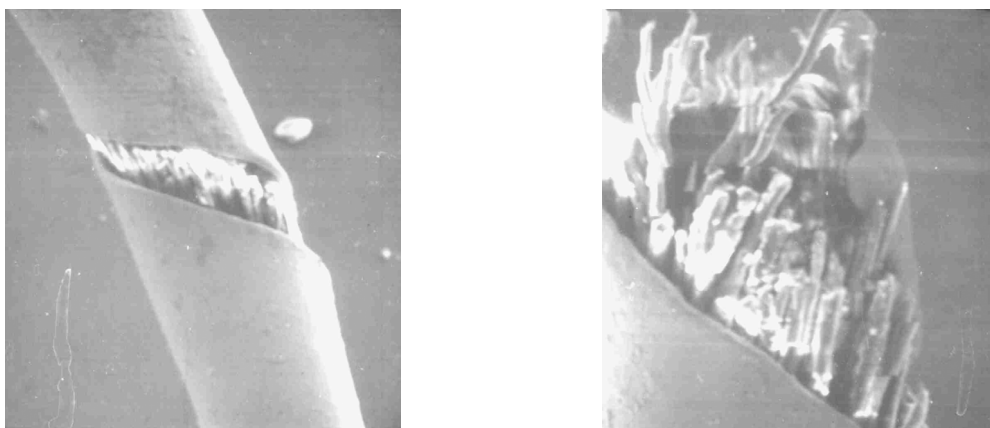


Figure 2. Thread image made up of a metal lamina (a) and interior threads (b).

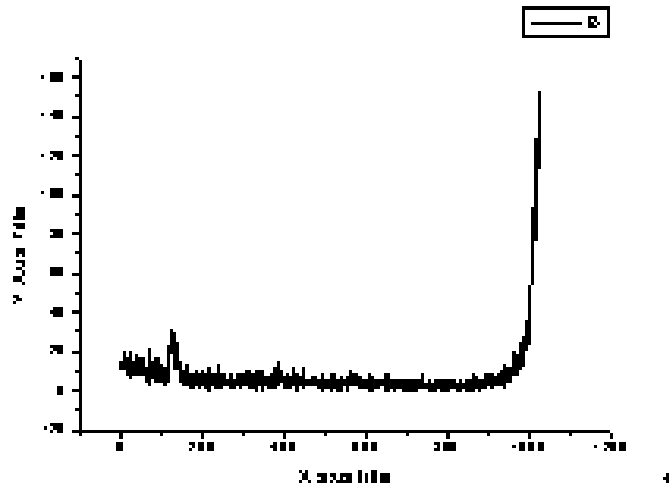


Figure 2(c). X-ray fluorescence spectrum of the composed thread. Detected elements in decreasing order of importance (KeV vs cps.): silver, tin, rhodium, palladium, copper, gold and iron.

In the case of a stole, the cloth was very worn and torn so it was very difficult to tighten the loose threads with the silk threads. As well, we had to restore its cloth since it was very brittle probably due to the weight of the silver threads.

The two processional crosses only had loose threads therefore their restoration was easy.



Figure 3. Baby Jesus and detail of his dress

The threads of the robe of Baby Jesus (Figure 3), which had come loose due to its presentation during Christmas on the manger of the altar, were also tightened. As can be seen from the figure, it was an important Baby Jesus, so the corresponding scientific analysis was also carried out on his robes.

The results of the analysis can be seen in Figures 4(a),(b), (c), and (d). Figures 4(a) and 4(b) show images of the thread and the surface of the thread. Figure 4(c) shows a region typical for deterioration of the protective varnish coating. Figure 4(d) shows an X-ray fluorescence spectrum of the lamina. Detected elements in decreasing order of importance are copper, zinc, iron, silver, antimony, tin and palladium. Again this shows that the thread was processed from relatively crudely refined ore.



Figure 4a. Image of the laminar thread (SEM):

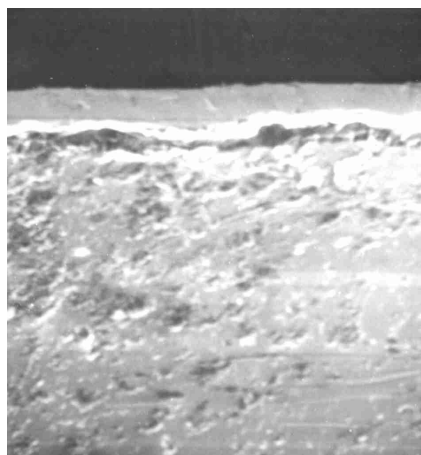


Figure 4b. Detail of the surface of the thread (SEM).

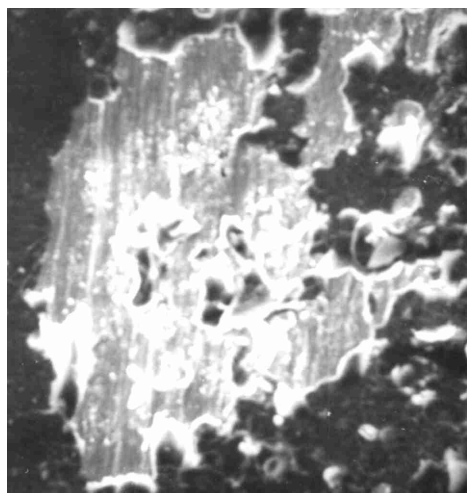


Figure 4c. Detail of the deteriorated surface varnish (SEM).

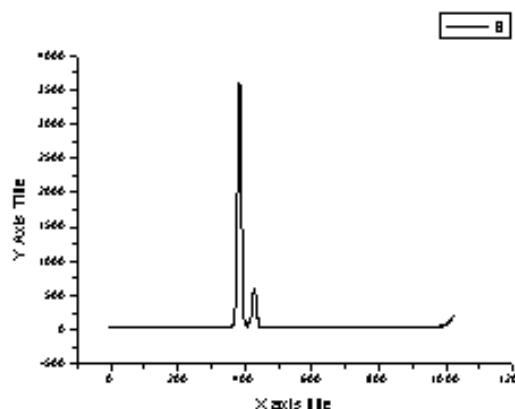


Figure 4d. X-ray fluorescence spectrum of the lamina. Detected elements in decreasing order of importance (KeV vs cps.): copper, zinc, iron, silver, antimony, tin and palladium.

The restoration work in the Museum of the Cathedral of Valdivia was carried out with students of the post-degree on Restoration. They were the first students of the post-graduate degree in Restoration, during 1998.

2.2 At the Cathedral of Santiago

The city of Santiago de Chile was founded by Pedro de Valdivia on February 12th, 1541, at which time the cathedral was given a site. Construction work did not proceed until 1547. Called the Assumption of Our Lady in 1560, in 1560 it was substituted by a new factory, which in turn was destroyed by the earthquake of May 1647. This was destroyed and fell in the earthquake of 1679 and was replaced in June 1730.

The plans of the current cathedral were commended in 1753 to the Bavarian Jesuits Pedro Vogel and Juan Hagen. In 1780, when through the petition of Bishop Manuel de Alday y Aspee to King Charles III, the Roman architect Joaquin Toesca took over the work. He was followed by Juan Jose de Goycolea followed by Vicente Larrain, Eusebio Chelli, Fermin Vivaceta and Ignacio Cremonesi. The cathedral was finished in 1831 but it was only consecrated in 1906.

It keeps valuable paintings and works of gold and silversmiths, most of which were made by coadjutor Jesuit brothers who came from Bavaria. The collection went on to the cathedral after the expulsion of this religious order in 1767, most of these objects which are kept in the Museum of the Cathedral and others are displayed in the old sacristy.

2.3.1 Analysis, Conservation and Restoration:

The Cathedral of Santiago asked me to make a diagnosis of the state of its silver, gold and bronze collections in order to be able to restore them in a second phase. Gold did not pose any major problems, but the silver, which had been cleaned with great enthusiasm with a Chilean chemical product (Brasso[®]), did severely damage the patina. All the religious objects of the chapel of the Holy Sacrament shone brightly. On the other hand, the main altar of the Cathedral made of platen (silver with copper) had some relief, and some parts of it were able to be saved. The person who did the work previously did not do the work meticulously, cleaning only that which was the easiest to clean: the surface. Some silver objects had been cleaned with a kind of crumbly, chalky lime, which left some scratches. Since the collection only had damage due to cleaning, and a patina cannot nor should not be forged, no restoration was carried out in the collection of the Cathedral. But the Bishop and his team were advised to use milder chemicals such as the product Tarnished Silver Cleaner on the colonial silver collection.

A theoretical-practical class was also given to the personnel of the museum in order to teach them how to use this chemical, since after applying the product; the object must be washed and thoroughly dried. Damage by chemical products used in cleaning could also be observed on the bronze objects. These were iron pieces dipped in bronze. The chemical ate away the bronze leaving the iron exposed.

Amongst these was a bronze fountain with was encrusted with green corrosion and stains produced by a very strong chemical, possibly an acid, that had burnt the surface of the fountain leaving brown rust circles. After analysing the fountain, it was discovered that the material was not bronze but brass. The origin of the circles could not be discovered. The green stains were eliminated mechanically with a scalpel (triangular). Efforts were made to remove the other stains with distillate water, but the auras remained visible. They were now clean but it was plain to see a missing piece of brass on the surface of each aura.

In the Cathedral a great collection of silver and gold embroidered textiles, chasubles, stoles, et cetera, exists. Because the Cathedral authorities are concerned for the state of their collection, the Museum asked me to restore a very beautiful processional cross which has a red background embroidered with silver and gold religious themes. The silver threads had become loose and the image had been damaged since this cross had been frequently used in processions. The external gold fringes, which were added to the object 10 years ago to make it look more beautiful, were in good condition. In the restoration, the silver threads were attached to the cloth with silk threads and surgical needles. No new threads were used. In some parts, the original silver thread was missing; certainly someone must have taken it as a souvenir. The Museum wanted the eye of the Saint to be painted again. This I did not do since there was no information on it in order to know how it was, who our saint was looking at.

In the cathedral itself there is a sculpture of the Virgen del Carmen. It is a life size wooden structure with a porcelain face and dressed (Figure 5a). The Virgen del Carmen is the Patroness of Chile. The robe is full of silver and gold thread embroidery. Since she is deeply venerated and frequently touched by the faithful who go to ask for her help, many ornaments had become loose. All of the silver and gold threads and the ornaments were put back in place on the cloak using silk threads and curved surgical needles. Once the work was finished, it was again put on public display since in the Cathedral of Santiago the Virgen del Carmen cannot be allowed to be absent from her station.

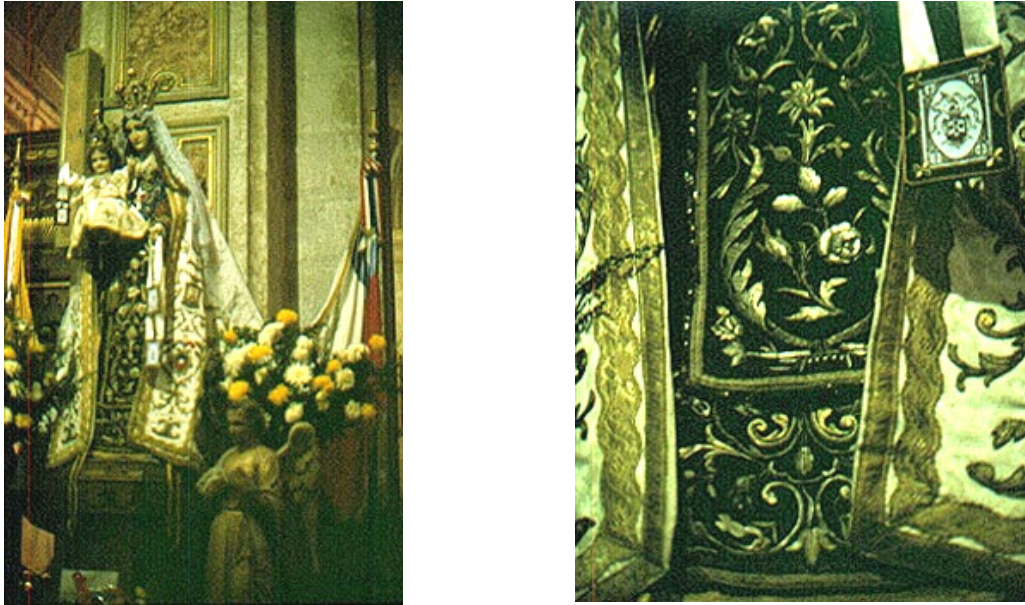


Figure 5(a). Photograph of the Virgen del Carmen and detail of her dress

The Virgen del Carmen comes from the school of Cataluña. The cathedral was asked for authorization in order to carry out a study on the silver and gold threads used in the embroidery of her cloak so as to also have in our investigation an object from our Mother Land. Thus we would be able to observe the extent to which there was an influence of the Spanish techniques on the manufacturing of threads in Latin America.

The results of the analysis (Figure 5 b) showed the principal components of the thread to be copper, silver, and gold.

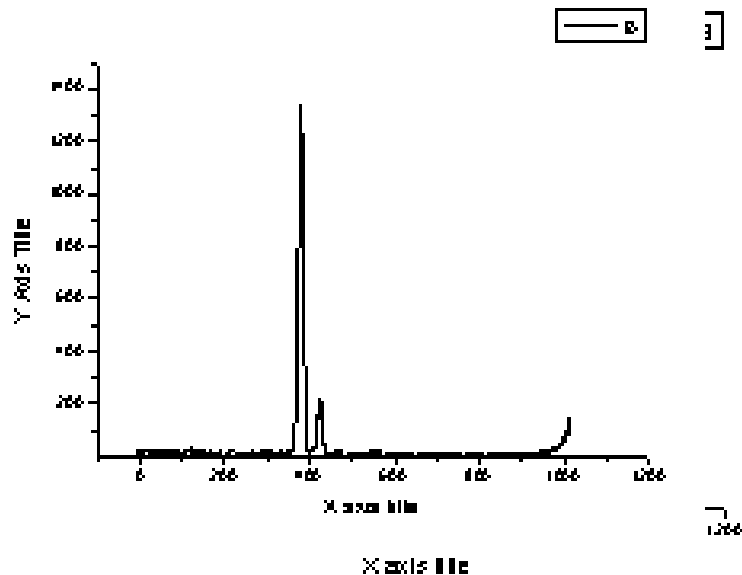


Figure 5(b) X-ray fluorescence spectrum of the composed thread. Detected elements in decreasing order of importance (KeV vs cps.): copper, silver, gold, tin, zinc, antimony and iron

2.4 Saint José del Carmen in El Huique

Continuing on the topic of the silver and gold threads used in the robes of religious saints I here describe my work in the Hacienda of El Huique in December of 2002, which is currently an important National Monument, now turned into a museum, the “museum of Saint José del Carmen of El Huique”

The property has its origins in the great Hacienda Larmagüe, which extended over 30,000 hectares, lying between the Cachapoal and Tinguiririca rivers (central zone of Chile, near the city of Santa Cruz).

The farm was the property of Ms. Paula Mercedes de Lecaros y Lecaros, married to Mr. Pedro Gregorio de Echeñique. The property was in the hands of this same family for six generations. Larmagüe was divided for the first time in the 18th century among the children of Mr. Pedro Lecaros.

El Huique for Mr. Miguel de Echeñique and El Almahue for his brother Antonio, the main house that is currently the museum rebuilt at the beginning of the 19th century. Later on, Mr. Miguel Echeñique divided his part among his three sons. The youngest of them receives the Hacienda calling it Saint José del Carmen of El Huique and began to build the house immediately in 1829 having 20,000 square meters including patios and dependencies.

El Huique is important for our Cultural Patrimony not only because it represents a typical Hacienda of the 19th century but also because it was the property of one of the presidents of Chile, President Federico Errázuriz Echaurren who was in office as president of Chile between 1871-1876, spending the hot summer in El Huique with his family.

El Huique also has a beautiful church which has a façade with a 23 meter tower, crowned by a copper dome. The person in charge of the building of the church was Mr. Juan José Echeñique Bascuñan approximately in 1857. It has a Baroque style, wooden carved altars with applications of leaves of gold and marbled, balusters with Murano crystal. This is a most beautiful country church, perhaps the best in Chile. It has sculptures of great artistic value inside, especially the Quiteño angels, the Nazarene colonial Christ, Saint Frederick and Saint Magdalene.

2.3.1 Analysis, conservation and restoration of some of the pieces of the Museum

I created in El Huique a conservation laboratory where we restored a Nazarene Christ with damage caused by people who pulled on the threads, a Quiteño angel who had been attacked by termites (Figure 6a), Saint Magdalene (Figure 7a) and Saint Frederick (Figure 8a). They had damage caused by mice on the lower part of their robes. This is a common problem for *in situ* museums, which are surrounded by farmlands.



Figure 6 . Colonial Angel of the School of Quito.

The images and X-ray fluorescence spectrum of the threads used in the decoration of the dress of the Colonial Angel is shown in Figures 6(a, b, c and d).

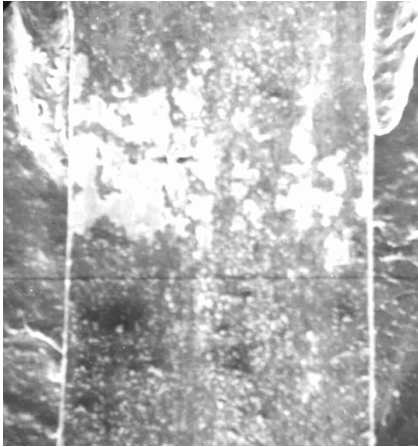


Figure 6a. Image of the laminar thread (SEM):



Figure 6b. Detail of the surface of the thread (SEM).

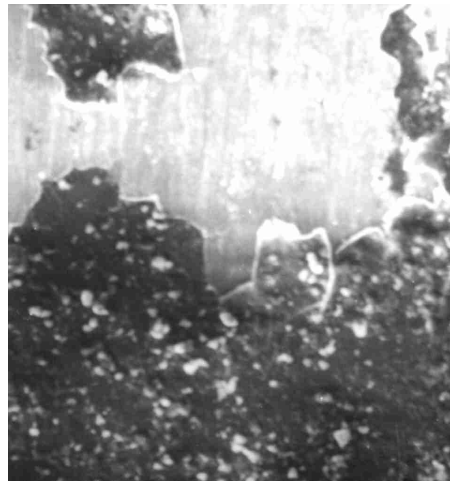


Figure 6 c. Detail of the deteriorated surface varnish (SEM).

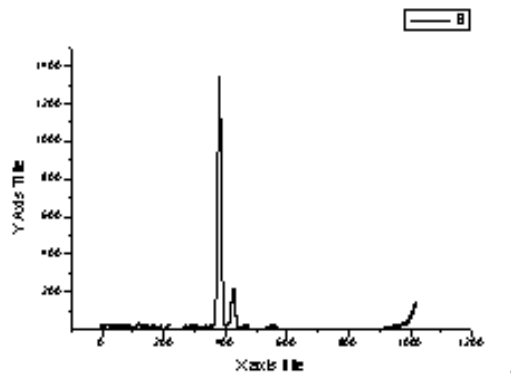


Figure 6d. X-ray fluorescence spectrum of the lamina. Detected elements in decreasing order of importance (KeV vs cps.): copper, zinc, rhodium, silver, antimony, tin, gold, palladium and iron.

The angel has damage to its structure due to termites, and, as well the lower part of its robe has also been damaged by mice. To eliminate the termites, each hole in the angel was disinfected with Xylamon, and later each hole was sealed with virgin wax, so that a new attack could easily be identified in that way.

In order to strengthen the robe, the damaged parts were reinforced with natural linen, attaching it to the original cloth, which was the same colour. It was done with silk thread using surgical needles; the loose threads of the robe were also tightened.

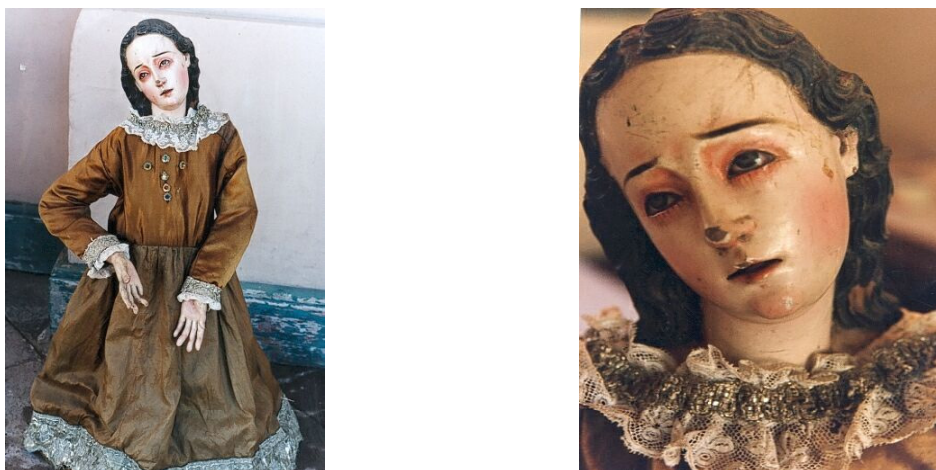


Figure 7a. Saint Magdalene, colonial, School of Cuzco

The images and X-ray fluorescence spectrum of the threads used in the decoration of the dress of the Saint Magdalene are shown in Figures 7 (b and c).

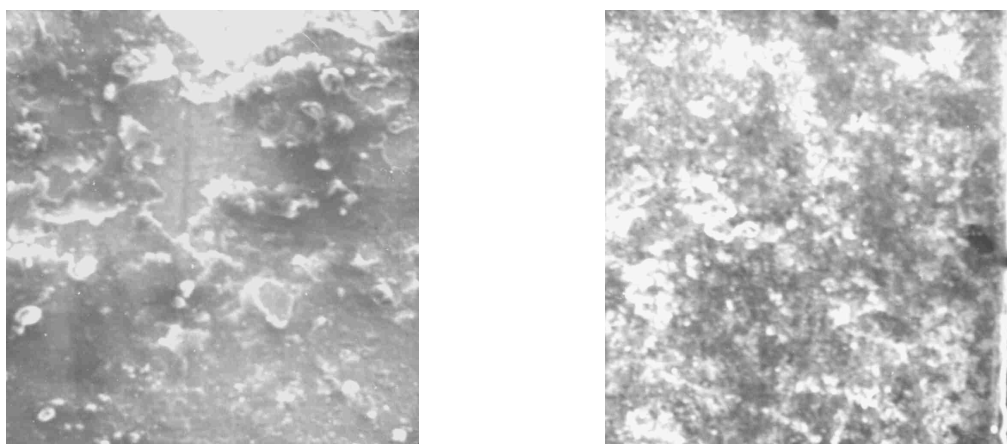


Figure 7b. Image of the metallic lamina and its deteriorated superficial varnish (SEM).

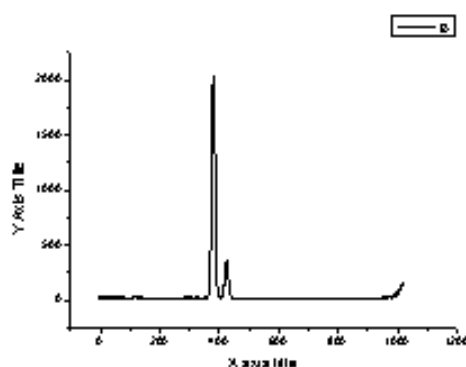


Figure 7c X-Ray fluorescence spectrum of the composed thread. Detected elements in decreasing order of importance (KeV vs cps): copper, silver, zinc, antimony, tin and iron.

In the inside of the sculpture, Saint Frederick, School of Cuzco Saints, did not have a body but only a staff, which supported the head and the arms. Again the couching technique was used in the restoration of his robe in order to put the threads back to their place.



Figure 8a. Saint Frederick, colonial, School of Cuzco

The images and X-ray fluorescence spectrum of the threads used in the decoration of the dress of the Saint Frederick is shown in Figures 8 (b and c).

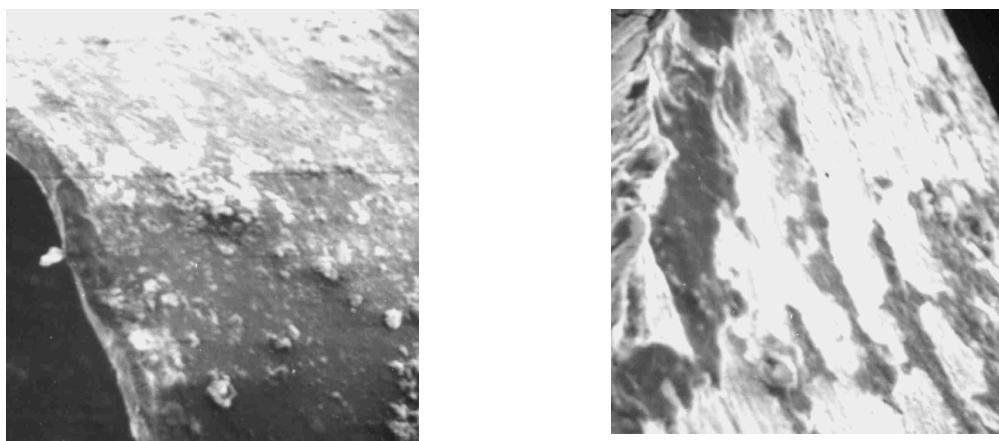


Figure 8b. Image of the metallic lamina and its deteriorated superficial varnish (SEM).

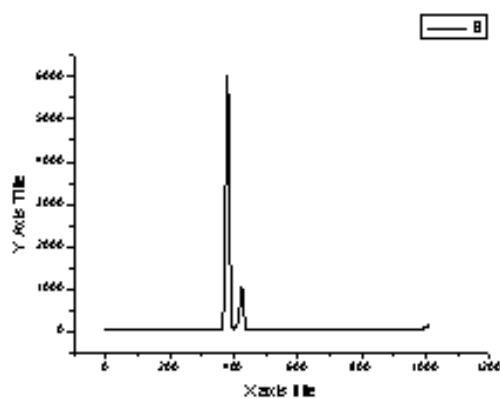


Figure 8c. X-ray fluorescence spectrum of the composed thread. Detected elements in decreasing order of importance (KeV vs cps): copper, zinc, silver, tin, antimony and iron.

This saint had the lower part of his robe very eaten away by mice, so we had to make a graft from a cloth similar to the original, in order to reconstitute the dress. The couching technique was used for all the work of restoration.

3. Summary of results

Table 1 is a summary of the analyses carried out giving the relative elementary composition of the constituents in (wt %)

It can be readily seen that the “gold and silver” threads are not of great purity, indicating that the techniques for the purification of the metals were quite primitive. Previously, a study in colonial silverwork (insert reference) was carried out in which the objects from Chilean religious art analysed were also metals of much lower category than those quoted in the literature.

Table 1. Relative elementary composition (wt %) obtained by X-ray fluorescence spectrometry.

No.	Sample	Fe	Cu	Zn	Au	Ag	Sn	Sb	Rh	Pd
1	Pluvial Cathedral of Valdivia	0,02	0,05	0,00	0,03	98,34	0,48	0,00	0,28	0,80
2	Baby Jesus	0,20	97,81	1,49	0,00	0,19	0,10	0,10	0,00	0,11
3	Virgen del Carmen	0,24	95,75	0,29	0,53	2,51	0,43	0,26	0,00	0,00
4	Saint Magdalene	0,12	96,69	0,25	0,00	2,59	0,14	0,21	0,00	0,00
5	Quiteño Angel	0,21	93,67	4,06	0,00	0,58	0,33	0,49	0,44	0,24
6	Saint Frederick	0,06	98,17	1,23	0,00	0,28	0,16	0,10	0,00	0,00

For me it was a pleasure to be able to work in the collections presented in this paper for each piece was a beauty, and besides, they were a challenge to restore.

As it can be appreciated, in this project the conservation of pieces, which are important for National Patrimony, has been achieved and new information on the composition of Chilean colonial silverwork has been obtained.

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