



Article: After the fire at the Church of La Compañia de Jesus, Quito, Ecuador

Author(s): Constance Stromberg

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Street NW, Suite 320, Washington, DC 20005. (202) 452-9545

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AFTER THE FIRE AT THE CHURCH OF LA COMPAÑIA DE JESUS, QUITO, ECUADOR

Constance Stromberg

Abstract

La Compañía de Jesús is a high style Baroque church built between 1605 and 1767. Its interior is covered with ornately carved polychrome or gilded decoration and mural paintings. Located in Quito's historic city center, it has been under restoration since 1992. In January 1996, just as the conservation of the altarpiece of San Francisco Xavier was near completion, solvent fumes caught fire when an overloaded electrical outlet exploded. The fire affected an estimated 10% of the church, including more than 50% of the altarpiece, a portion of which was irretrievably lost. The main cupola was damaged, as were the four life-size relief figures of the evangelists just below. Numerous ethical and practical questions arose concerning what could be preserved and what was lost. Areas of the altarpiece considered totally lost, without form, or unstable were replaced and other pieces were conserved and remounted. As of September 1999, decisions have not been made concerning whether to repaint and regild burned areas.

The Quito school of art and conservation in the historic city are reviewed, as well as factors that may have contributed to the occurrence of the fire in the church. Several conservation problems and treatments undertaken in the church before and after the fire, along with the investigation and use of alternative resin/solvent combinations for consolidation of the burned wood are discussed. Conclusions are drawn from the resin investigation and treatment of some of the burned sculptures.

1. Introduction

Quito, Ecuador is located at 9,300 feet, in the Andes Mountains of South America. It is now roughly divided between colonial Quito and the modern city to the north, built after 1945. Much of old Quito has been left standing and was declared a World Heritage Site by UNESCO in 1978 (Afshar 1994). Spanish conquistadores moving north from Peru founded Quito in 1534, where the indigenous people had been conquered 60 years earlier by the Incas. The European conquerors built churches and buildings on the foundations of the Incan buildings they ruined (Keleman 1957).

The Quito School of Art was founded in the middle of the 16th century at the church of San Francisco de Quito. Local and Peruvian artisans were trained in the European techniques of carpentry, sculpture, and painting by Flemish, Spanish and Italian priests and artisans. This was the first of many churches in colonial Quito built and decorated by indigenous artists (Vargas 1982). In the 16th century, European images and designs were copied for religious images, with technical and stylistic developments added throughout the 17th and 18th centuries (Escudero de Teran 1992). Quito School churches are highly ornamented, within a framework of Renaissance

Stromberg

and Baroque building plans. Facades are carved in stone and the floorplan is in the form of a cross, with at least one cupola, a main altar and side altarpieces to various saints (Donoso 1983). Two of the best known and most sumptuously decorated churches are La Compañía de Jesús (fig. 1) and San Francisco de Quito (fig. 2).

2. Conservation in the Municipality of Quito

While they do not have great financial resources, Quiteños take pride in their heritage. The Municipality of Quito funds conservation of its historic buildings through the Fondo de Salvamento, which oversees projects contracted out to private conservation companies. Each church is also responsible for the care of its historic structures. However, during the conservation at La Compañía, the priests were mostly concerned with continuing religious practices in the church without interruptions from the ongoing work. The devoted also expect the images they worship to glorify the church, and not necessarily to show the patina of time.

2.1 La Compañía de Jesús

Begun in 1605 and finished in 1767, during the high Baroque style, La Compañía de Jesús is modeled after Gesù in Rome, the mother church of the Jesuits. Layer upon layer of decoration was added to this huge structure over 15 decades (Keleman 1957 and Vargas 1982). Locally quarried volcanic andesite (*andesítico valsáltico*) was used for the stone façade and other walls (fig.3). Interior walls are mainly decorated with painted stucco, molded plaster designs and woodwork. The central cupola is plaster over pumice stone blocks, and walls supporting altarpieces are brick.

La Compañía is said to contain seven tons of gold leaf in its approximately 70 meter long by 25 meter high interior. There is a main altar, a pulpit, a high central nave and eight floor-to-ceiling altarpieces (*retablos*) in vaults along the sides containing paintings and polychrome and gilded wood balconies, balustrades, columns and sculptures (fig. 4). Four high relief, life-size polychrome evangelist figures are just below the central cupola, and there is a smaller cupola over the main altar. Mural paintings of the 12 archangels, lunettes of 12 cardinals, 37 polychrome wood winged cherub heads, and molded and painted plasterwork adorn the central cupola (fig. 5).

2.1.1 Techniques of Polychrome Sculpture

Polychrome sculpture techniques from the Quito school have been well-documented (Escudero de Teran 1992, De Vuyst and Beltran 1992) and are summarized here for reference to treatment problems of sculptures in the church. Technical information and methods of construction for individual pieces are given here when known by the author. Although analytical testing was at

Stromberg

times subcontracted out at La Compañía to address specific conservation issues, such as analysis of certain paint layer cross-sections and stone samples, wood was often only identified visually.

Quito School figures began with whole logs or blocks of wood glued together with animal glue, then carved and finished. Commonly used woods included cedar (*Cedrela odorata*) and alder (*Alnus accuminata*). Knots and imperfections were sealed with animal glue, and then the wood was gessoed with a mixture of animal glue and calcium carbonate or calcium sulfate, after which more fine finishing was carried out. Flesh (*encarne*) and other areas were painted in oil, animal glue or egg tempera colors, sometimes with wax added. Pigments included lead white, vermilion, malachite, azurite, bone black, verdigris and earth colors (De Vuyst and Beltran 1992).

Not all polychromy on the sculptures in La Compañía were gessoed before painting. In the cupola black paint on the cherubs' hair was applied directly on the wood, but the *encarne* of the faces has gesso layers beneath, that vary in composition from fine to coarse. Cross-sections taken from the face of a cherub in the cupola after the fire showed two layers of calcium carbonate gesso separated by a layer of animal glue. Identification of burned *encarne* paint was inconclusive.

Areas to be water or mordant gilded were coated with Armenian bole then gilded with gold or silver leaf and tooled by the gilder (Portell 1992). Water gilding often had transparent oil glazes. Elaborately patterned garments were detailed in color on the gold or silver leaf base, in a painting over metal technique called *estofado* or quilting. The *escrafiato* technique continues by scribing into the paint layer to reveal a pattern in the metal leaf below and is illustrated by the garments of the evangelist figures (fig. 6). Added after the 17th century, *estofado a la chinesca* employed colored varnishes over silver gilt areas to give them the appearance of gold. In the 18th century, garments were often made using *tela encolada*, plaster covered cloth that was gilded and painted.

2.1.2 Conservation at La Compañía de Jesús

Dampness, soluble salts, fungal problems and insect infestations are continuous problems in Quito buildings due to heavy periods of rain and large daily temperature gradients (Gomez-Moral 1994). Pollution and human occupation also cause problems in Quito churches. The most recent major earthquake hit Quito in 1987 and damaged the central transept and cupola and the south wall of La Compañía de Jesús.

La Compañía has been undergoing its current restoration since 1992. Contractors have worked on the interior and exterior of the central cupola to try to correct problems caused by dampness and soluble salts in the building fabric and decoration. Extensive work was also done on polychrome and gilded wood, mural paintings and painted plasterwork in the main altar, the retablo of San Francisco Xavier, and in other areas of the church. However, it is not possible to present complete information here about treatment methods and materials used as many different

contractors were involved and not all documentation was accessible. The work included: fumigation with pentachlorophenol; consolidation of worm eaten wood with Acryloid B72 in lacquer thinner; replacement of insect damaged wood; surface cleaning and repair of polychrome sculptures; and removal of overpaint layers on some important sculptures.

In the cupola, the combination of calcium sulfate gesso, porous volcanic stone and dampness has caused worsening problems over time, requiring at least five courses of conservation treatment in the past century. This was exacerbated in 1993, when an unsupervised crew improperly replaced mortar between glazed ceramic tiles on the exterior, causing further ingress of water. That mortar was replaced again with a water-repellent silicone mortar in 1997.

The group that directs and funds the current project is comprised of the Municipality's Fondo de Salvamento, the Instituto de Patrimonio Cultural and the Jesuit church. This team plans and oversees all conservation decisions and work specifications. Private restoration firms carry out the work with approximately 30 workers between them, many of whom also study in the conservation training program at the Technical University of Quito. Although the philosophy of the participants is to adhere to accepted conservation procedures, including the use of reversible materials and documentation, there is pressure to work quickly and minimize costs.

3. The Fire

In January 1996, as the conservation of the San Francisco Xavier altarpiece neared completion, solvent fumes caught fire when an overloaded electrical outlet exploded. Fire swept up from the altarpiece into the cupola, also damaging the main altar and the arch of the transept. The fire department responded rapidly, so that only approximately 10% of the entire church was affected. Fortunately, many of the sculptures from the San Francisco Xavier *retablo* had not been reinstalled. Only one of its four columns was severely burned, but they all suffered water damage and loss of water gilding and gesso layers when the fire was extinguished (fig. 8). More than 50% of the altar sustained damage, including about 35% that was irretrievably lost. The *encarne* layers on several images in the main altar became blistered and distorted.

The fire was drawn into the cupola when the scaffolding boards under the four relief figures of the evangelists just below the cupola ignited. These figures were severely damaged by the intense heat given off by the burning boards. Paint and ground layers were burned away from the heads, hands and feet, and their wood surfaces were charred, but the sculptural form and the gold leafed and painted garments remained (fig. 6 and 7). Mural paintings on plaster in the cupola sustained fire and water damage. After the fire was extinguished, further problems with soluble salt crystallization occurred as the water soaked cupola dried out toward the interior of the church. Two of the archangel oil paintings on linen were lost (fig 9). The cherubs and other wooden elements burned in varying degrees of severity depending on the path of the fire as it swept through the cupola towards the windows at the top (fig. 12).

After the terrible reality of this disaster registered with those working on this national treasure, numerous ethical and practical questions arose concerning what was considered lost, what could be preserved and the methods to be chosen for compensation of losses. The decision was made to recarve in cedar what was determined to be totally lost, without form, or unstable. Other pieces were kept, such as carved and gilded decorative wooden panels burned at the back but with well defined surface detail (fig. 10). Images and decorative areas that were partially burned but with some gilding or paint layers intact, and very important pieces, such as the four evangelists have been conserved. However, some questions may never be answered, including: the extent and morphology of damage in individual pieces; and the value of consolidating carbonized wood when surface layers and an unknown quantity of substrate were lost. Air circulation in the church remains inadequate; however, explosion proof outlets and upgraded wiring are now in place.

4. Conservation After the Fire

Bubbled paint was treated on some of the main altar images soon after the fire (fig. 11). Blisters were poulticed with cotton soaked in dilute animal glue, which was also injected under the bubbles. A heated spatula was used to reform blisters after facing with tissue.

Conservation of the interior of the cupola after the fire began with the rebuilding of the huge work platform at its base. From the platform we could see and feel tiny particles of spalling paint and plaster raining down on us, as the crystallizing salts pushed off surfaces of the mural paintings and painted plaster. These exfoliating surfaces had to be immediately stabilized. Conservation of the mural paintings and plaster moldings in the cupola are outside the scope of this article (see Rogers 1980 and Schwartzbaum 1985). It is important to note here that the crystallizing salt problem had to be mitigated by facing and consolidating the spalling mural paintings before soot removal, making it much more difficult to remove soot after consolidation. Other problems included: removal of degraded PVA consolidant (Borden Polico 2153) used on murals and painted decoration before the fire; removal of soot and burned Acryloid B72 surface coating; drying and stabilization of the cupola walls; and treatment of burned polychrome sculptures (fig. 12).

4.1 Investigation of Consolidants for Burned and Worm-eaten Wood

My involvement in the project began in May 1996, with one of the contractor companies called Trateggio. They asked me to investigate consolidants, communicate with experts about the treatment of burned wood and do empirical tests on samples of burned and insect damaged wood. This investigation was undertaken so that Trateggio could recommend treatment options to the project supervisors, for the burned red cedar *retablo* elements, and the cherubs and evangelists. We decided to compare Acryloid B72 in various solvent combinations and Butvar B98 in alcohol, following a literature search and personal communication with researchers at the Forest Products

Laboratory and the Canadian Conservation Institute (Barclay and Grattan 1997, Schniewind 1997).

The stability and use of Acryloid B72 in conservation is well documented (Carlson and Schniewind 1980). Butvar B98 is manufactured by Monsanto for lamination of car windshields (Monsanto 1989). It is resistant to heat and light aging and has also been tested and used in conservation to consolidate degraded wood for more than 20 years (Grattan, 1980, Schniewind and Kronkwright 1984, Wang and Schniewind 1985, Barclay 1987 and 1990). Although it does have a slightly yellowish cast, this is not a problem when charred wood is the material to be consolidated.

Our testing had two primary goals:

- To find a safer resin/solvent combination to use in the uncontrolled church environment.
- To determine if Butvar B98 consolidation could give sufficient strength and penetration, and add less weight to the cherub and evangelist figures that were mounted at acute angles.

Consolidant penetration through fragile char layers, down to the interface with sound wood was necessary. Figure 13 shows a cross-section of one of the burned red cedar samples, illustrating the thin boundary between burned and sound wood as well as cross-grain fissures that commonly form in the weak char layer (Zicherman 1981). Worm-eaten red cedar samples were included to observe resin penetration more readily and to look for treatment alternatives for the ongoing problem of insect damage in the church.

Acryloid B72 in lacquer thinner is the resin of choice in most developing countries, due to its stability, availability and low cost. However, the flammability, toxicity and retention of lacquer thinner fumes in poorly ventilated areas cannot be overemphasized. Consolidation tests were done with Acryloid B72 in acetone and ethanol to offer a safer solvent option if Acryloid B72 was chosen over Butvar B98. However, acetone is a controlled substance and difficult to obtain in Ecuador, due to its use in cocaine production, so lacquer thinner generally is used instead.

4.1.1 Empirical Tests

Consolidant was applied by syringe to surfaces initially pre-wetted with ethanol. Samples were kept in closed containers for one day between applications to slow evaporation and improve resin penetration. Resin was applied 16 times to all samples (see charts for different concentrations) and surfaces remained glossy by the 14th application on many of the burned ones. Because of uneven absorption by the randomly burned and worm-eaten wood, resin quantities varied between 10-20 ml. for each application. Immersion was not feasible due to dissolution of carbonized wood in all solvents. Impregnation under low pressure would have increased penetration but was ruled out due to the unknown depth of carbonization and fragility of protruding design elements.

4.1.2 Consolidation Test Results

Although these tests were done on site with uncontrollable variables, rudimentary methodology, and discarded sections of burned and worm-eaten wood, the results offer practical treatment information. One drawback of Butvar B98 illustrated well during the tests was its high viscosity. Burned samples consolidated with 10-15% B98 showed resin buildup on surfaces after only few applications, so the tests were modified. Penetration improved markedly by diluting the B98 resin to a 3% solution for the first five or six applications, then increasing the concentration to 7.5%.

Charts 1 and 2 show the different resin concentrations and the weight gains of samples consolidated with Butvar B98 and Acryloid B72 in burned and worm-eaten cedar (fig 14). Samples with Acryloid B72 in thinner gained more weight in both cases, partly because of better resin penetration, due to lower viscosity and slower solvent evaporation. The worm-eaten samples gained between 40 and 110% of their weight due to their tunneled structures. Burned samples became from 3.3 to 7.4% heavier, since the carbonization only penetrates about 3-6 millimeters and there is nonporous, sound wood beneath.

Consolidation with both resins in different solvent combinations appeared to have penetrated through the char layer in the samples, to the interface with sound wood, when each piece was sliced through to assess depth of penetration. However, results were inconclusive in the burned samples, due to the presence of Acryloid B72 consolidant applied just before the fire. In our empirical strength measurements the Butvar B98 samples were harder and more resistant to thumbnail scratches than the Acryloid B72 samples. After seeing the higher strength and lighter weight of the Butvar B98, best illustrated by handling the sponge-like worm-eaten samples, the team was convinced it was the better option for treatment of sculptures mounted at acute angles in the church. However, Acryloid B72 appears to achieve better penetration than Butvar B98 and may be suitable for burned wood consolidation in other situations.

4.2 Dismounting and Consolidation of the Cherubs in the Cupola

We began the first phase of the conservation of the burned wood with the removal and consolidation of 37 cherub heads from the cupola. Due to the rapidly deteriorating condition of the cupola, it was not possible to do a complete technical study of the cherubs before treatment. After removal of loose carbonized material, the cherubs were faced with tissue and gauze applied with dilute polyvinyl alcohol, then dismounted by cutting the four nails holding them to the cupola wall.

The cherubs were removed for consolidation because of their acute angle of attachment to the cupola and because of dampness trapped in the wall behind them. After their removal, deep holes were drilled into the pumice stone where they had been removed. Drying of the cupola wall was

Stromberg

aided by inserting Pellon sleeves containing silica gel into these holes, which were periodically taken out and oven dried to remove moisture from the silica gel.

The facing was mechanically removed from the cherubs in the workshop, after dampening with cotton poultices. Loose charred surfaces were removed mechanically, down to the gesso layer. Discolored but un-carbonized paint was not removed. Cherubs were consolidated with nine to 18 applications of 3% Butvar in isopropanol or ethanol (depending on availability), applied by brush and syringe. Between applications of consolidant the cherubs were kept in sealed containers, to improve penetration by slowing evaporation of the solvent. After consolidation, 10% Butvar in alcohol was injected into cracks and large fissures were filled with Grilonit epoxy bulked with glass microballoons. Chunks of carbonized wood from points of hair or noses, which had detached due to shrinkage during evaporation of the alcohol, were readhered with Acryloid B72 adhesive.

The highest row of 12 cherubs, called *estipites*, were more badly damaged due to previous insect attack (fig. 15). Fire penetrated these figures more easily, through the network of exit holes left by the borers. Since they were vertically attached, we could partially consolidate them in situ, with eight to ten applications of 3% Butvar B98 in alcohol, before their removal. They were consolidated further in the workshop with approximately ten applications of 10% Butvar B98 in alcohol. Overpaint was mechanically removed from the wings, revealing gilded scrollwork. Unfortunately, I had to leave Ecuador in June 1997, before the project was completed.

4.3 Epilogue: The Evangelists and the San Francisco Xavier Retablo

In April 1998 I was able to return and review some of the work done on the burned wood since I had left. Consolidation, cleaning and some fills were completed on the cherubs. The evangelists were surface cleaned, partially consolidated, faced, and dismantled, as was done with the cherubs. This time the challenge was greater due to their size, acute angle and attachment height. Also, the fragile estofado gold and painted layer on the garments was barely supported by the burned wood beneath. Enormous spikes holding the figures to wooden anchors embedded in the wall were cut from the back to dismantle them (fig. 16).

Conservation of the San Francisco Xavier altarpiece was also completed. The infrastructure of the heavily burned midsection was rebuilt to support conserved and re-carved panels, which were remounted after treatment. Soot was removed from gold leafed carved panels with turpentine. Butvar B98 in alcohol was used to consolidate salvageable burned sections, with the addition of pinholes made down to normal substrate. This facilitated penetration and insured a stronger bond between the carbonized and undamaged wood beneath. For gap filling and gesso materials, PVA emulsion mixed with glass microballoons was used, and epoxy bulked with microballoons was used to fill large losses.

5. Conclusions

After empirical testing, Butvar B98 in alcohol was chosen to consolidate charred wood on sculptures and decorative elements from burned areas of the church of La Compañía de Jesús. This treatment provided a safer method of conservation in an uncontrolled environment. It has also introduced a proven conservation material to conservators working in Ecuador, where access to new materials is often limited. Other widely used conservation materials, such as silicone rubber and glass microballoons also were introduced during this project. Acryloid B72 in thinner also continued to be used for conservation of wood in the church, in a safer manner than before the fire. Further tests for the treatment of burned polychromed and gilded wood should be undertaken by a conservation facility equipped to carry out more controlled procedures, in order to obtain measurable results on the use of consolidants for burned wooden sculpture.

The part of La Compañía that was effected by the 1996 fire now waits in limbo between conservation of damaged sections, and restoration of those areas that would integrate them into the resplendent interior. Decisions concerning the level of restoration that will be carried out will be made by a large committee composed of many voices. If the religious community prevails, an extensive repainting of burned areas will probably take place.

Acknowledgements

Being part of the conservation team at La Compañía was an invaluable experience. I would especially like to thank Manuel Jimenez and Ramiro Pozo of Trateggio, who were interested in learning about new materials, techniques and conservation literature. Although it was impossible to convince them to stop using turpentine or thinner, they were receptive to testing and using materials new to them, such as Butvar or resins bulked with glass microballoons. They were patient with my Spanish and generously shared their knowledge of the Quito School of Art.

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Stromberg

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Stromberg

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Sources of Materials

Acryloid B72: Rohm and Haas Company, Philadelphia, PA 19105, USA.

Butvar B98: Monsanto Plastics & Resin Co., 800 N. Lindburgh Blvd., St. Louis, MO 63166, USA.

3M Glass Bubbles (Type: K1): 3M Structural Products Department, 220-7E 3M Center, St. Paul, MN 55144

Author's Address

Constance Stromberg, Cultural Patrimony Specialist, US Embassy/Lima, Unit 3370, APO. AA 34031, USA. (cstromberg@bellnet.com.pe)

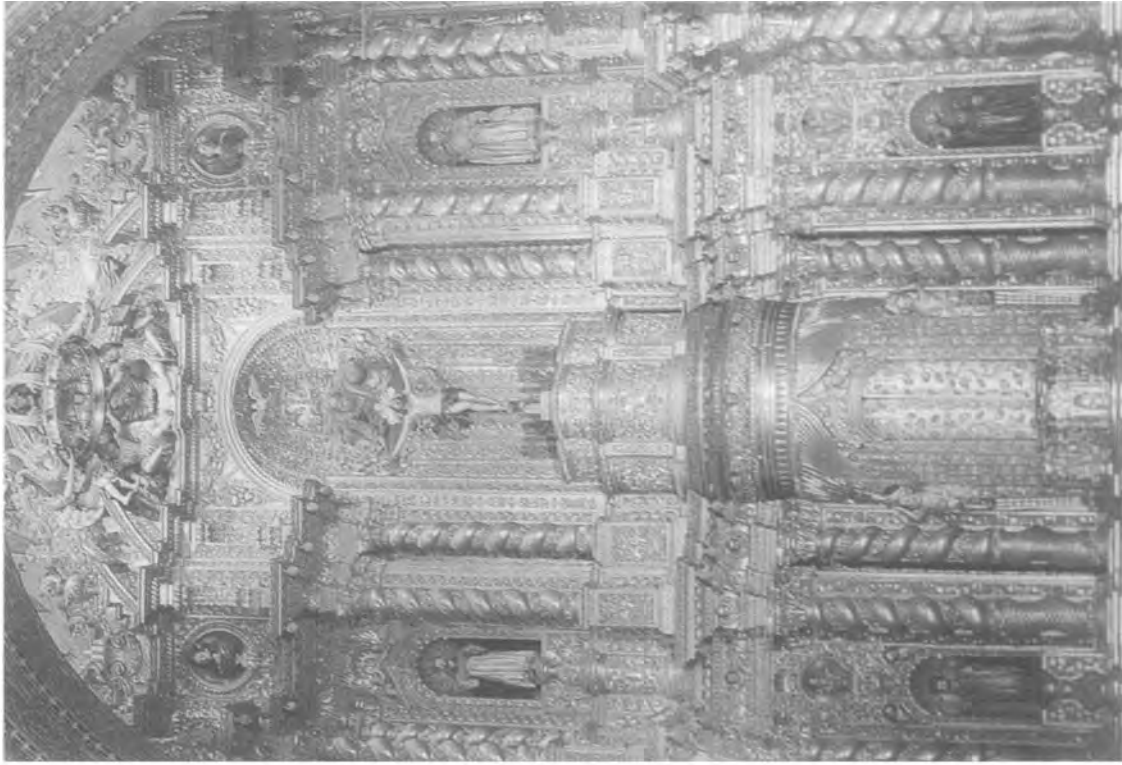


Figure 2. Main altar of the church of San Francisco de Quito.



Figure 1. Main altar of the church of La Compañía de Jesús.

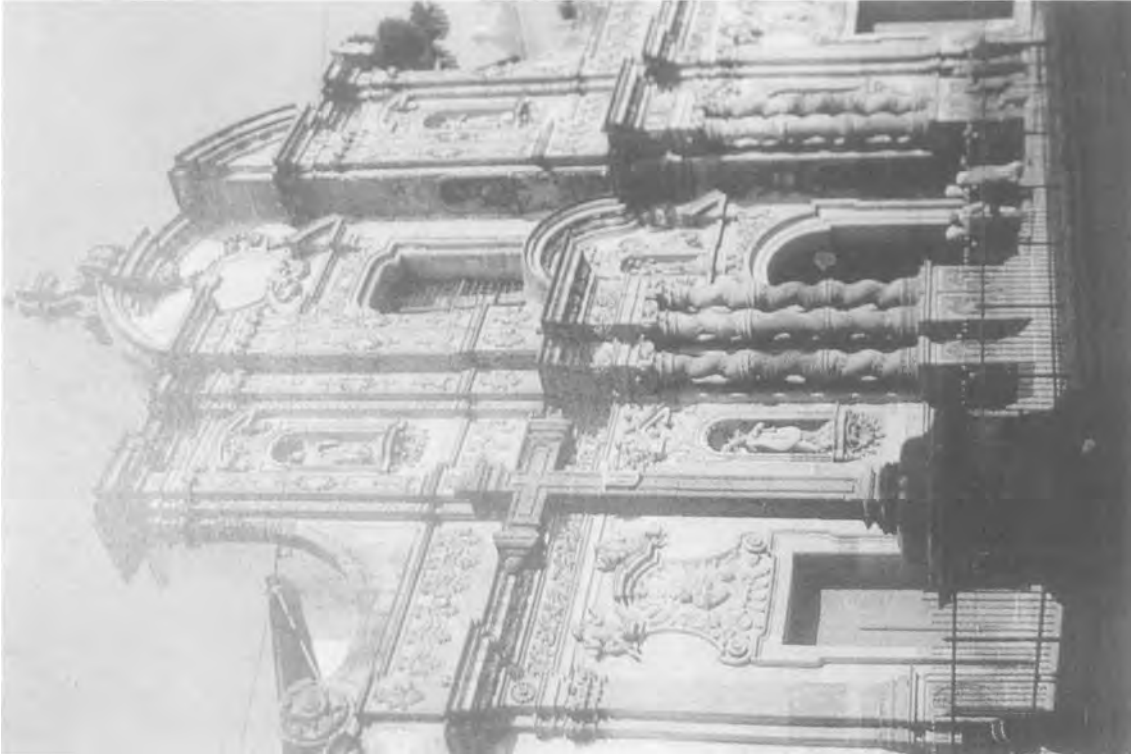


Figure 3. Stone façade of La Compañía de Jesús.



Figure 4. San Francisco Xavier altarpiece before the fire.

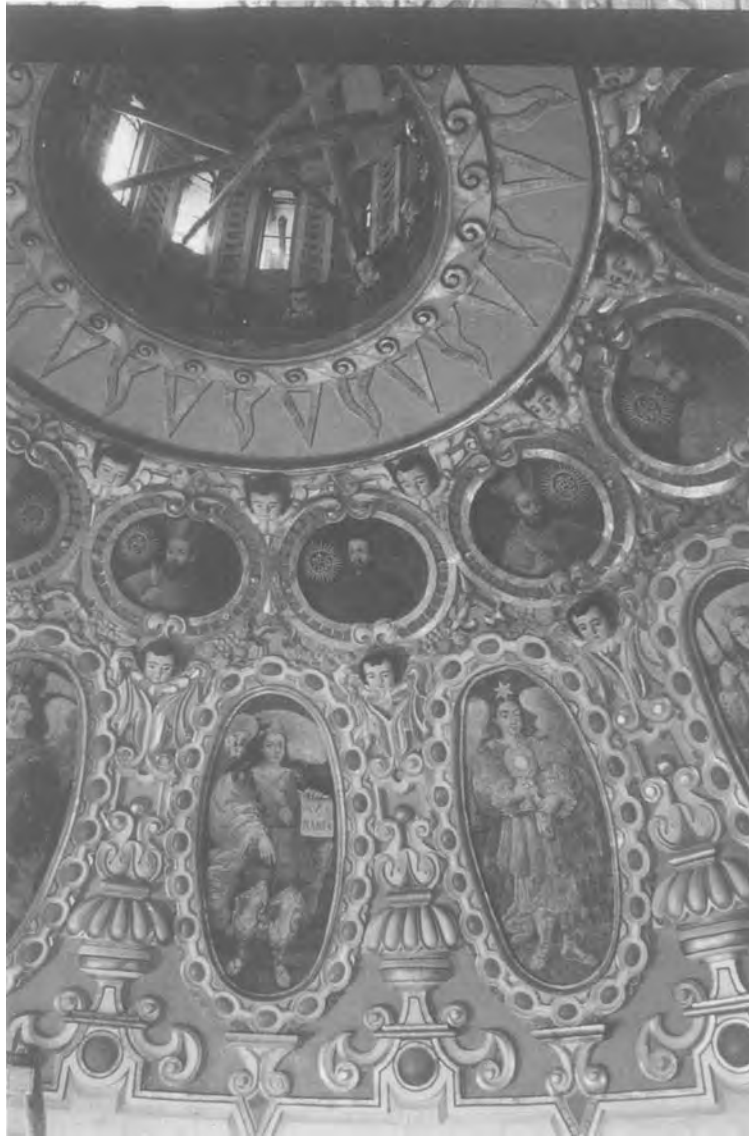


Figure 5. Mural paintings, cherub heads and plasterwork, central cupola, La Compañía de Jesús.



Figures 6 and 7. High relief life-size figure of the Evangelist San Lucas, before the fire on the left and after the fire on the right.

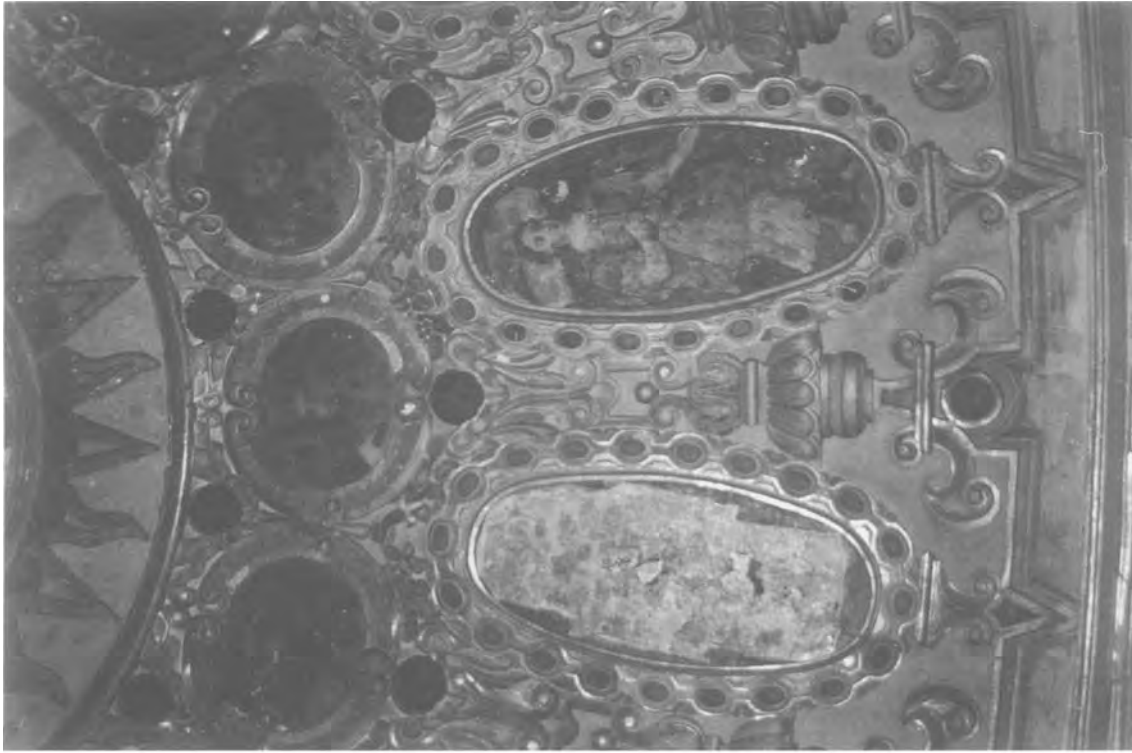


Figure 9. Burned cherub heads and lost painting on linen in the central cupola, after the fire.



Figure 8. The four columns from the San Francisco Xavier altarpiece, removed after the fire.

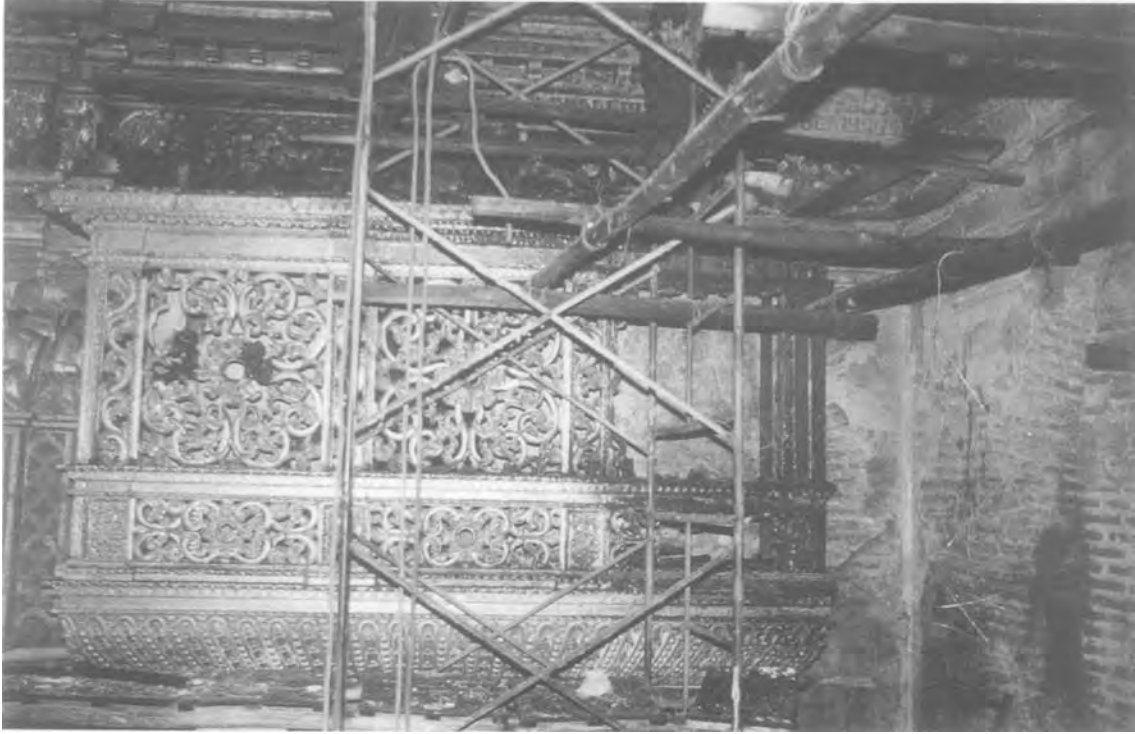


Figure 10. Partially burned gilded panels in the San Francisco Xavier altarpiece.



Figure 11. Blistered encarna on polychromed figure of an angel in the main altar.

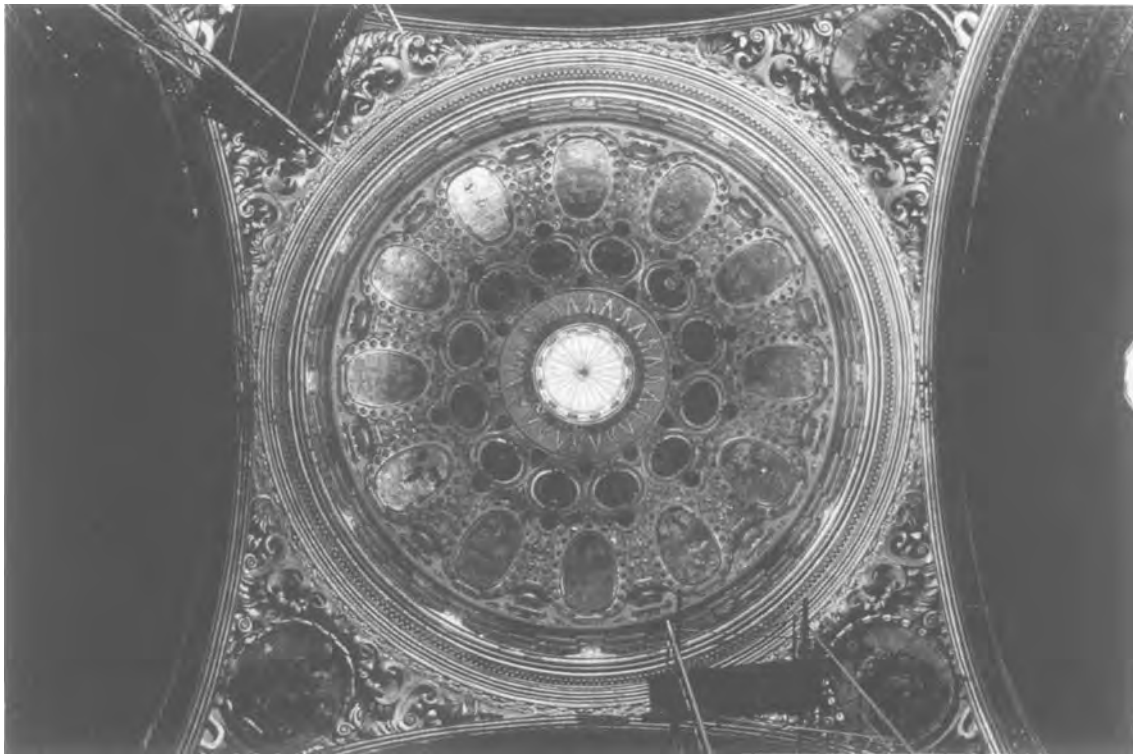


Figure 12. Central cupola, evangelist figures and scaffolding, seen from the ground after the fire.

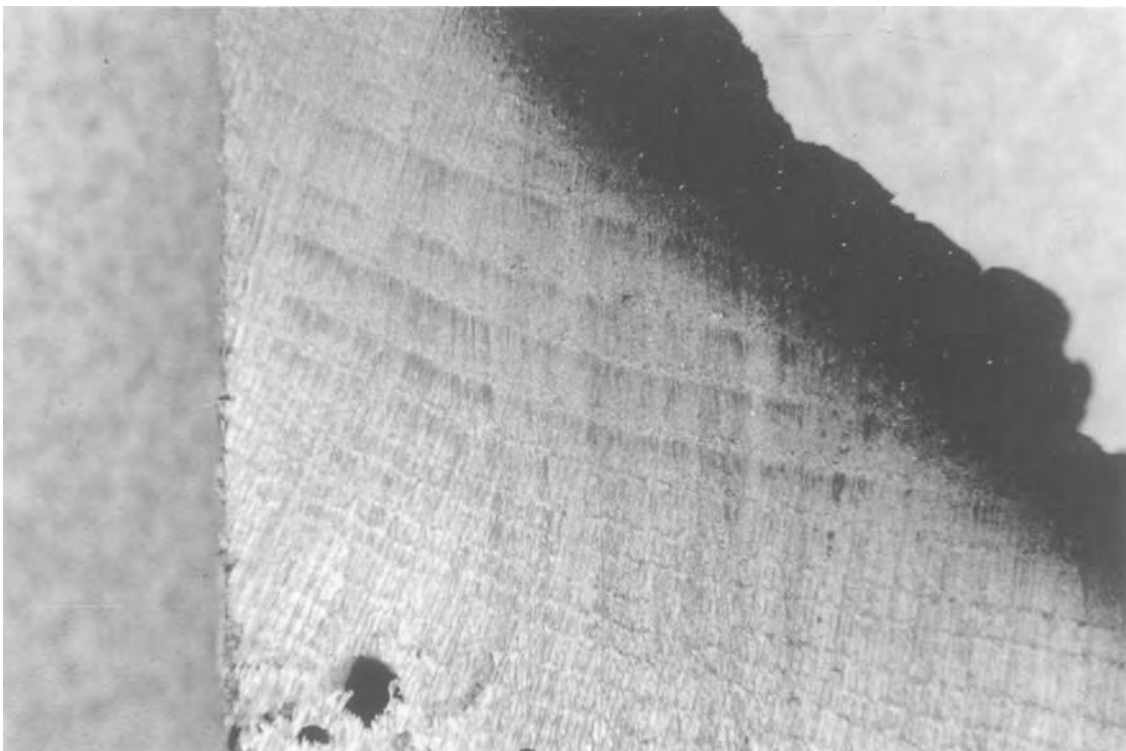
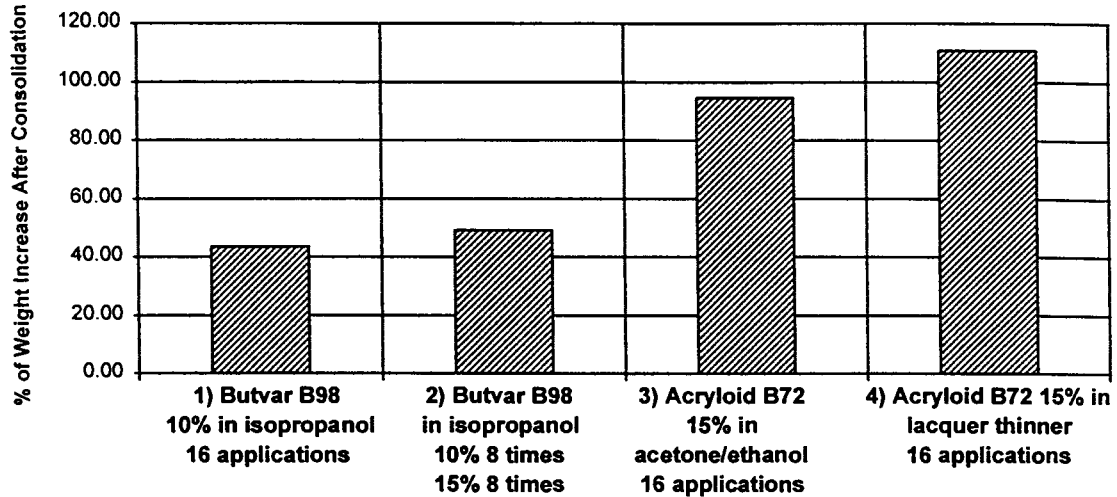


Figure 13. Cross section of a cedar sample showing the border between the char and sound wood.

**CHART 1
Worm-Eaten Cedar Consolidated Samples**



**CHART 2
Burned Cedar Consolidated Samples**

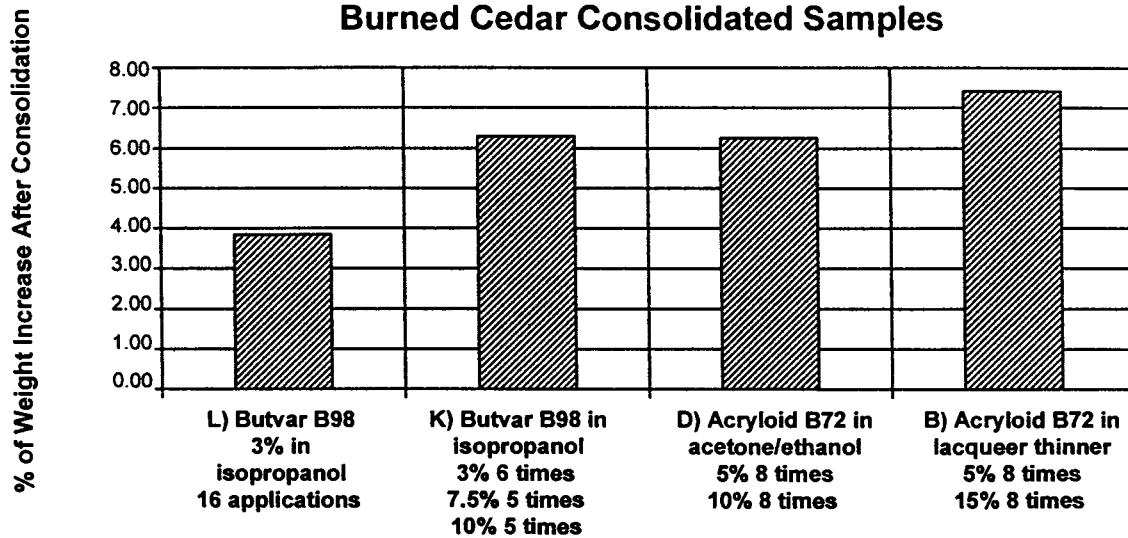


Figure 14. Charts 1 and 2 show the difference in weight gain between samples consolidated with Acryloid B72 and Butvar B98.



Figure 15. One of the estipites at the highest level, in the linterna above the cupola after the fire.



Figure 16. Dismounting of an Evangelist figure after partial cleaning, consolidation and facing.