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**Stucco Relief from Structure XIX, Palenque**

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**Research Year:** 1999

**Culture:** Maya

**Chronology:** Late Classic

**Location:** Chiapas, México

**Site:** Palenque, Group of the Cross

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## **Introduction**

The conservation and restoration area is an important part of the Group of the Cross Project, and is responsible for the rescue, preservation and restoration of artifacts found during the excavation, and for the maintenance and restoration of objects bound to remain *in situ*.

The conservation and restoration area is made up of graduate students of the National School of Preservation, Restoration and Museography "Manuel del Castillo Negrete", and inhabitants of the city of Palenque, who have been trained by the preservation experts and worked under their supervision.

During the August 1998 field season, the remains of a polychrome stucco relief found in the interior jamb of the central pilaster in Structure XIX were removed and salvaged, together with all the fragments disseminated among the collapsed rubble. Later, the preservation and restoration works of the relief continued during the months between December 1998 and June 1999. During those months the goal established was to restore the shape and size of the relief, based on all fragments found in the excavation. Nearly 80% of the relief was recovered, and its size increased from 1.10 m to 3.40 m.

The recovery of the image in the stucco relief was a slow process, but one that upon completion served to provide abundant information regarding the manufacturing technique and other characteristics of the structure such as a more accurate size of the pilaster, which allowed for a greater knowledge in regard to the construction of this building.

Once the preservation and restoration processes of the stucco relief were completed, the relief was displayed in the exhibition "El tiempo en espiral", ("*Time in a spiral*") at the "Alberto Ruz Lullier" site museum located at Palenque's Archaeological Zone, Chiapas, which was a part of the activities scheduled for the 1999 Palenque Round Table.

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## **Acknowledgments**

The Conservation and Restoration Department wishes to thank FAMSI for the support provided in the efforts that led to the salvage, conservation, restoration, museographic assemblage and associated research of the stucco relief found in Structure XIX. We appreciate both the economic funding and the moral support received.

We are also in debt to all those who collaborated in the rescue, restoration and conservation of the stucco relief throughout the many months involved in executing the different processes, including this final report. We thank the restorers: Gerardo Calderón, who participated in the project, Alejandra Mata Avila who took part in the conservation, and Alessandro Perinelli for his moral support and his drawings. Our gratitude is also extended to Nicolás Rivera and Constantino Armendariz Ballesteros for being there at the end, for their support during the completion of this final report, both with the photographs and the drawings, and for their help throughout the project.

We also wish to thank the Project Director, archaeologist Alfonso Morales C., the Field Director Christopher Powell, Julia Miller, and in general all those who were a part of this project for their continued support and help in everything we needed.

Above all, we want to mention those who worked as our assistants, for putting up with us and for doing exactly what was requested of them, even when such efforts involved, more than once, working past midnight.

It is important to mention also the museographer Enrique Sandoval, for he designed and manufactured the three-dimensional structure made of aluminum bars that provided its permanent support to the stucco panel, as this was the first time that a structure of this kind was used in restoration works in México and maybe in the entire world; we also thank him for his support during the presentation at the Round Table, and for his help in writing the text for it.

## **Background**

In July 1998, during the excavation works of the "Group of the Cross Project", liberation works were undertaken in Structure XIX (see [photo 1](#)). In an exploration probe made at the center of the building a central pilaster was found, and deeper in the excavation, mixed with the rubble, fragments of polychrome modeled stucco fragments (see photo 2) were found, together with flat fragments which were a part of a flat surface with a red color (see photo 3).



**Photo 1. Liberation from the building**



**Photo 2. Discovery of molded stucco fragments**



**Photo 3. Discovery of molded stucco fragments**



**Photo 4. Interdisciplinary rescue with archaeologists and restorers**



**Photo 5. Delimitation of molded stucco fragments**

The rescue of these stucco fragments was carried out jointly by archaeologists and restorers (see [photo 4](#), above), with the recovery of each stucco fragment using levels (see [photo 5](#), shown above), removing the larger stones, and recording and marking the limits of each fragment. Once the fragments were liberated and documented, they were individually kept in humidifying chambers to prevent collapse and carbonation as a consequence of quick drying, and to avoid an elevated outdoors effect that could turn them into dust, or cause fissures, cracks and fractures both in the fine plaster and the relief remains, preventing as well the detachment of the paint layer.

As the excavation work progressed, the remains of a molded stucco relief were uncovered, attached to the jamb of the central pilaster (see [photo 6](#)). Once the pilaster was completely liberated, we were able to fully appreciate the magnitude of this relief and its state of preservation (see [photo 7](#), below). Finally, upon the full liberation of the pilaster it was inferred that the approximate portion of the stucco relief in situ amounted to 40%, while the rest of it was mixed with the rubble (see [photo 8](#), shown below).

Once the piece was recorded, it was decided to release the stucco panel and to take it to the lab for its preservation and restoration. The project's preservation team was determined to recover the largest possible portion of the image by attempting to reassemble the fragments found within the rubble with the portion still in place, fixed to the wall.

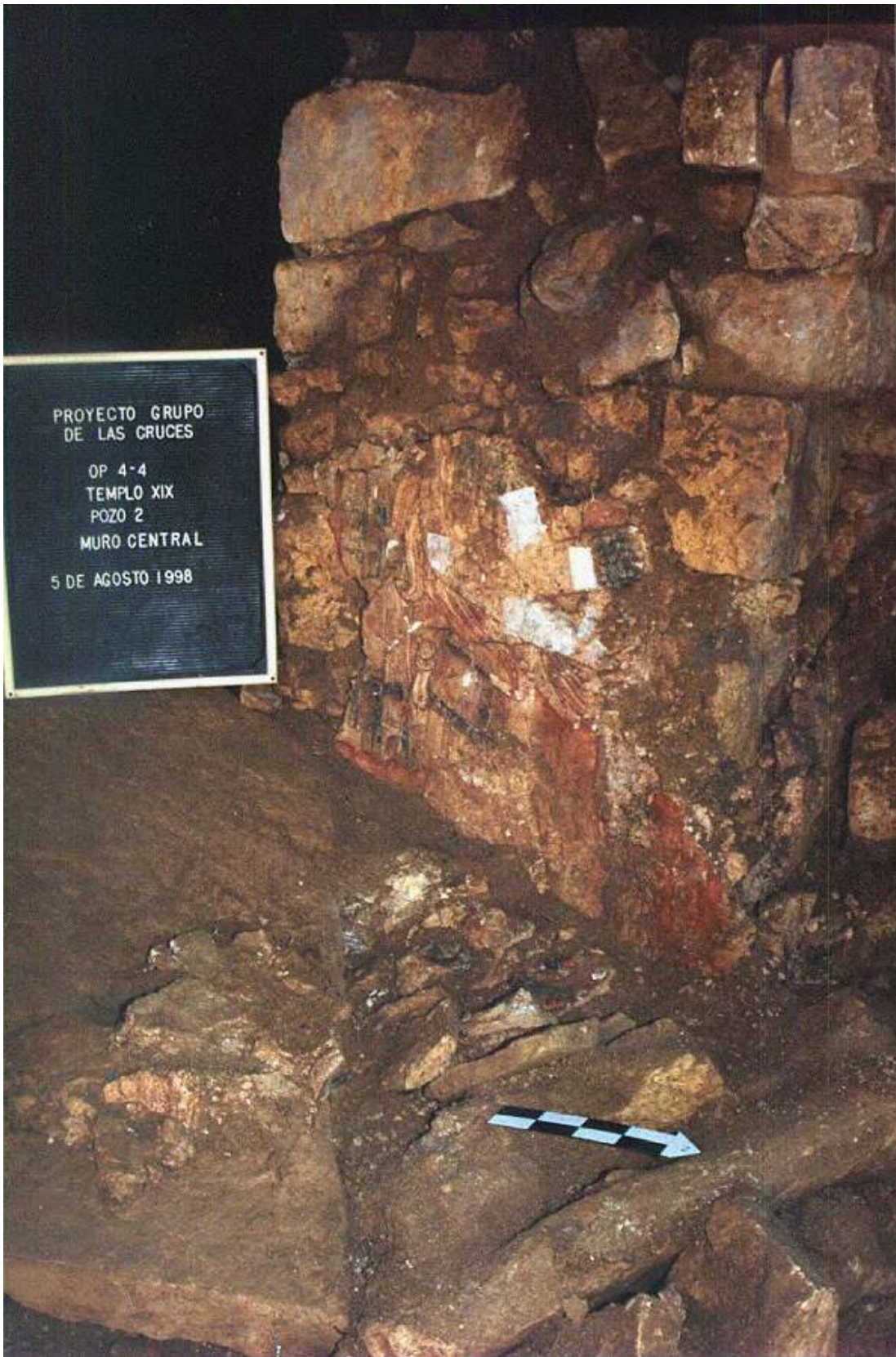


Photo 6. Stucco relief attached to pilaster





Photo 7. Stucco relief attached to pilaster



**Photo 8. Stucco relief attached to pilaster**

## Formal Description

This relief shows a male individual standing in profile in the action of walking and with his right leg forward. His hair is fastened upwards by means of a single band ornamented with the image of a god. The arms of the figure are stretched forward and the elbows are flexed. He is holding a feathered incense bag in one of his hands.

This individual is wearing a woven loincloth or short skirt with a ribbon that hangs between his legs. On top of the loincloth, he has a thick belt and on his waist there is an object which apparently represents the open mouth of an animal with teeth in the inner rim, and feather-like elements in the outer rim. The individual is also wearing a necklace and beaded bracelets. His feet and ankles are covered by richly ornamented sandals.

A headdress in the shape of a feathered serpent, and a hieroglyphic inscription can be appreciated on his head.

## Manufacturing Technique

As to the manufacturing technique, directly on the pilaster we were able to identify a first layer of thickly charged –coarse sand–, and on top of it, a plaster that covered the layer, and still on top, the modeled relief decoration in the form of *pastillaje*.

Because of the polychromy displayed, we believe this is a dry fresco, in other words, the pigment had an agent or binder which was to be applied on the stucco and which had not fully hardened. Some areas of the relief show two to three layers of polychromy indicating that, at some point, this stucco relief was given some maintenance.

## State of Preservation

The relief attached to the pilaster had an interior filling of earth and clay, alien to the original support, which were gradually deposited by sliding and filtration caused by rainfall, thus creating deformations and convexities in the stucco, as well as flaws and fissures, while some edges presented exfoliation and pulverization (see [photo 9](#)).

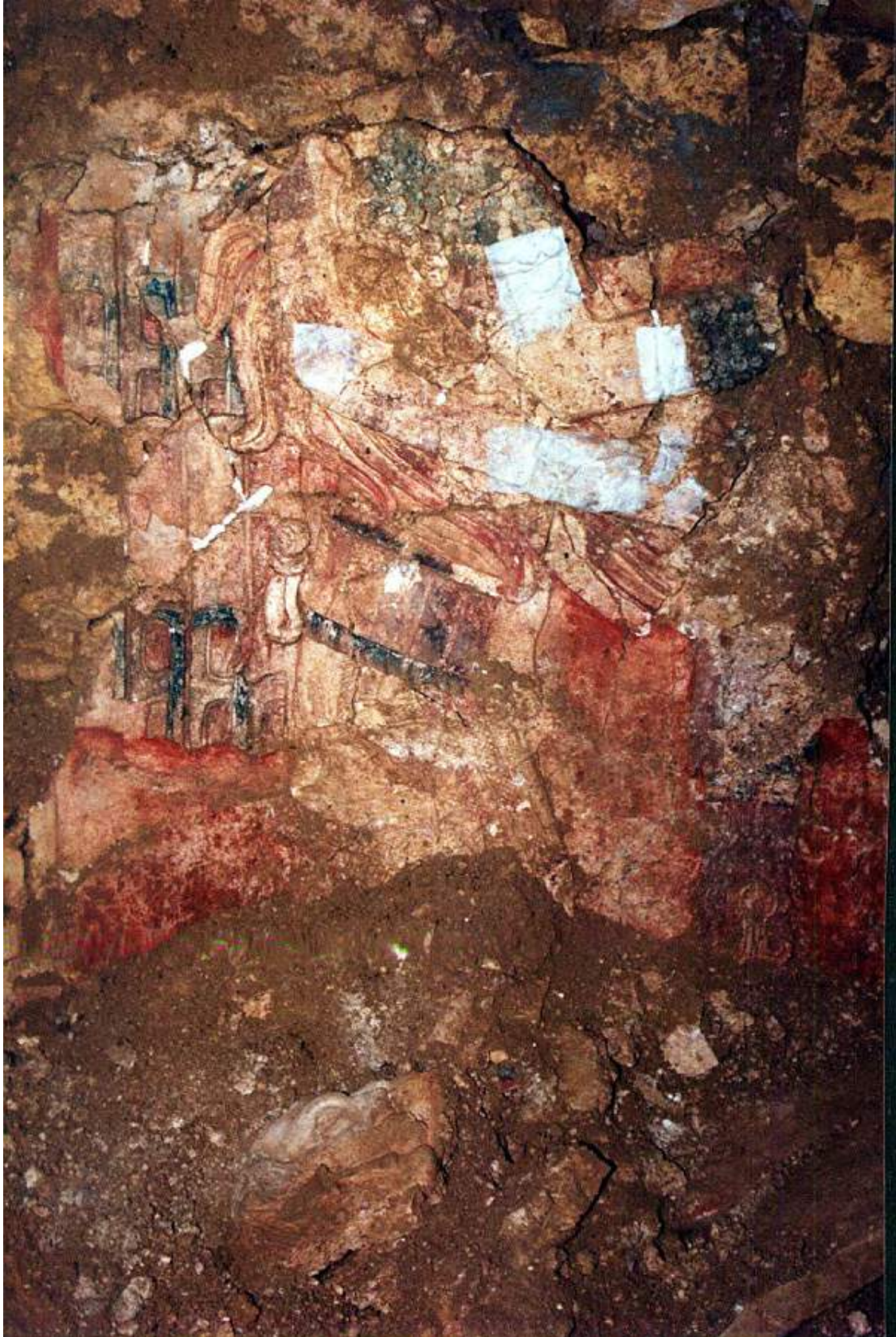


Photo 9. State of preservation of the relief

## Intervention Proposal

Because Structure XIX is still in the process of study and structural consolidation, and because the temple lacks a cover of its own, thus making the stucco relief vulnerable to environmental conditions and climatic changes that are at times extreme, in order to prevent the endangering of the physical integrity of the stucco as a consequence of vandalism and looting, as this temple lacks any appropriate security measures, not to mention the lack of maintenance and the passing of time, the restoration team proposes to release the relief still fixed to the wall and move it to the preservation workshop to accomplish all the necessary preservation and restoration procedures the piece requires, and later place it at the site museum for exhibition.

The proposal includes that a replica of the stucco fresco is placed where the original one used to be in Structure XIX.

## Treatments Applied

### 1. Loosening of the pilaster.

- Fixation of the pictorial layer: The pigment was fixed using Paraloid B72H, in a 5% concentration, applied by sprinkling.
- Partial covers: Loose fragments were partially covered with Japanese paper, using Paraloid B72H, in a 5% concentration, with acetone as the adhesive agent (see [photo 10](#)).
- Protection cover: This procedure was carried out by using a first insulating layer of a cheesecloth cover adhered with Paraloid B72H at a concentration of 3% in acetone, and by further placing another layer of China paper using Paraloid B72H at a concentration of 5%, to stick it together (see [photo 11](#)).
- Insulating layer: Aluminum foil was used as an insulating layer on the entire relief surface, after verifying that the foil was free of perforations (see [photo 12](#)).
- Provisional support: The provisional support consisted of a rigid layer of polyurethane foam which was injected between the stucco and a wooden frame so that the support would acquire the shape of the relief, thus preventing any movement during its transportation to the restoration workshop (see [photo 13](#)).

Once the polyurethane foam catalyzed, the provisional support was moved, and with the plank's weight and the lack of any adherence between the stucco and the pilaster, the stucco came off.

## 2. Transportation of materials to the restoration workshop.

- Once all the materials were taken to the lab, they were sorted according to their point of origin, separating those that were found among the rubble (see [photo 14](#), and [photo 15](#)), and the fragments detached from the pilaster (see [photo 16](#)); then, according to this classification the processes of cleaning, consolidation and assembly of the fragments was undertaken, according to the requirements of each piece. Later, a separation and preliminary grouping of materials was carried out depending on shapes, colors, paste types and their thickness (see [photo 17](#), and [photo 18](#)).

## 3. Superficial dry cleaning.

- Stucco fragments found in the rubble: These fragments underwent the superficial, mechanical cleaning processes, by means of soft brushes, small brushes, a surgical knife, a dissection needle and a small pear-shaped air pump to remove clay, carbonates, and organic material remains such as roots (see [photo 19](#)).
- Detached fragment: On the reverse of this fragment a superficial, mechanical cleaning was completed, using soft brushes, small brushes, a surgical knife, a dissection needle and a small pear-shaped air pump to eliminate clay, soluble salts and non-stucco materials, such as organic remains, stones, etc. (see [photo 20](#)).

## 4. Chemical cleaning.

- In the next step, a chemical cleaning was carried out on the fragments recovered from the rubble using a 1:1 solution of water and alcohol, applied with smooth hyssops to eliminate clay and soluble salts (see [photo 21](#)).

## 5. Consolidation.

- Fragments found within the rubble: This process was applied only to the most degraded fragments. Paraloid B72H was used at a concentration of 3%, dissolved in thinner and applied by dripping.
- Detached fragment: The consolidation process of the stucco support was done using Paraloid B72H, at a concentration of 3% in thinner, by dripping through venoclysis, and then with the application of sprinkled alcohol to disrupt the surface tension, inside a slow-dryer chamber (see [photo 22](#)).

## 6. Consolidation of cracks and fissures.

- A solution of calcium caseinate was injected on the reverse of the fragment detached from the jamb of the pilaster (see [photo 23](#)).

7. Repairs on the reverse of the detached fragment.

- With the surgical knife, the back side of the detached piece was leveled, lowering the most pronounced protuberances in order to obtain a surface as uniform as possible; then, the cracks, fractures and fissures were repaired with a repairing paste made of lime and fine limestone powder in a proportion of 1:2 (see [photo 24](#) and [photo 25](#)).

8. Insulating layers in the detached fragment.

- 2 layers of calcium caseinate: Once the repair dried up, two layers of calcium caseinate were applied with a soft-haired brush.
- 1 covering with cheesecloth and calcium caseinate: This process consisted of one covering made of double cheesecloth, in addition to calcium caseinate applied with a brush so as to stick the cloth and the stucco together (see [photo 26](#)).
- 1 covering with a Guadalajara cloth and calcium caseinate: Later, a second covering was accomplished with Guadalajara cloth and calcium caseinate (see [photo 27](#)) applied with a brush, attaching it to the cheesecloth to avoid air bubbles (see [photo 28](#)).
- 2 layers of folded tissue paper (see [photo 29](#)): Then, a provisional insulating layer of tissue paper was applied, which was adhered by humidity (see [photo 30](#)). Once this layer dried up, cardboard retainers were added to maintain the provisional support in place (see [photo 31](#)).

9. Provisional support.

- Plaster with polystyrene pearls: Once the layer of tissue paper dried up, a plaster layer with a load of polystyrene pearls was applied (see [photo 32](#)) to make this layer lighter, functioning at the same time as a provisional support (see [photo 33](#)).
- Plank in the shape of the stucco: When the plaster dried up, a plank in the shape of the stucco was added, to provide the panel with a greater support (see [photo 34](#)).

Then it was tied up to the plank (see [photo 35](#)) and turned over (see [photo 36](#)), and we proceeded to remove the insulating layers with which the stucco relief was detached from the pilaster of Structure XIX (see [photo 37](#)), which were as follows:

1. A plank, as a provisional support (see [photo 38](#)).
2. The layer of polyurethane foam (see [photo 39](#)).
3. The layer of tissue paper.

As soon as the layers of the detachment were removed, we proceeded with a superficial dry cleaning using a soft-haired brush to eliminate the powder and the clays on the surface (see [photo 40](#)).

Then a chemical cleaning with smooth hyssops while the partial covers of Japanese paper were eliminated (see [photo 41](#)); subsequently, the cracks and fissures were injected with calcium caseinate.

Once the calcium caseinate was dry, repairs were made with lime paste and stone powder,<sup>1</sup> and parallel to this process, the small fragments of loose and detached *pastillaje* that were in place were re-assembled with Mowithal B60H.

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<sup>1</sup> Throughout this process, the repairing paste traditionally used for mural paintings on stucco was used; as the restoration process continued and extreme climatic changes took place, we realized that this type of paste for repairs was not the most appropriate one for this particular relief, and therefore the decision was made to use ceramic repairing paste.





Photo 10. Area covered with Japanese paper



**Photo 11. Overall protection covers**



**Photo 12. Preparing the stucco relief for detachment**



Photo 13. Injection of polyurethane foam



**Photo 14. Stucco found in the rubble**



**Photo 15. Stucco found in the rubble**



**Photo 16. Reverse of detached fragment of the stucco relief**



**Photo 17. Sorting of stucco fragments according to shape, thickness, paste type and color**



**Photo 18. Sorting of stucco fragments according to shape, thickness, paste type and color**





**Photo 19. Superficial cleaning of stucco fragments found in rubble**



Photo 20. Superficial cleaning of reverse of detached fragment



**Photo 21. Chemical cleaning of fragments found in rubble**



Photo 22. Consolidation of fragments



**Photo 23. Consolidation of cracks and fissures on the reverse of the detachment**



Photo 24. Repair on the reverse of the detached fragment



**Photo 25. Repair on the reverse of the detached fragment**



Photo 26. Cheesecloth and calcium caseinate insulating layer





**Photo 27. Covering with Guadalajara cloth and calcium caseinate**



Photo 28. Covering with Guadalajara cloth and calcium caseinate



**Photo 29. Insulating layers of tissue paper**



**Photo 30. Application of insulating layers of tissue paper**



**Photo 31. Placement of cardboard retainers to hold the provisional support**



**Photo 32. Application of plaster with polystyrene pearls**



Photo 33. Provisional support



**Photo 34. Provisional support and plank with the shape of the fragment**



**Photo 35. Turning over the fragment detached from wall**



**Photo 36. Fragment of stucco relief detached from wall, front**





**Photo 37. Removal of insulating layers from the detachment**



**Photo 38. Removal of supporting plank of area detached from wall**



**Photo 39. Layer of polyurethane foam used to detach the relief attached to the pilaster**



**Photo 40. Dry, superficial cleaning of the detached relief**



**Photo 41. Elimination of partial covers of Japanese paper**

The fragments found among the rubble were subjected to the following procedures:

1. Search for the original location of the fragments (see [photo 42](#)).

We searched for the joints between the fragments to conform elements of a larger dimension (see [photo 43](#)); once the joints were located, the pieces were placed in the sand bed for handling and to obtain the same surface level, as the thickness between one piece and the other was variable and the sand allowed us to handle them without causing damage to the edges (see [photo 44](#), [photo 45](#), [photo 46](#) and [photo 47](#)).

2. Assembly of fragments in an attempt to form blocks (see [photo 48](#)).

As the joints of the stucco fragments began to be found, they were adhered with Mowithal B60H, with the aggregate of ceramic fiber to provide a greater resistance and they were later attached to the fragment detached from the pilaster (see [photo 49](#) and [photo 50](#)). The fragments were placed on the sand bed (see [photo 51](#)).

The fragments with smaller dimensions were attached with casein glue.<sup>2</sup>

3. Assembly of fragments found in the rubble with the fragment detached from the pilaster.

Once the place of each fragment was defined within the broader stucco relief, they were joined together with the rest using a synthetic glue with a load of ceramic fiber as an aggregate, to give the gluing a greater resistance, and work continued on its assemblage, both in the front and back, using a wooden grid and a plate of polyurethane resin as a support (see [photo 52](#)); this enabled us to add the fragments that surrounded the detached portion working on both sides (see [photo 53](#)) by placing provisional supports of polystyrene sheets in the areas where new fragments were being added (see [photo 54](#)). The sheet of polyurethane foam comprised only the space of the area detached from the wall (see [photo 55](#) and [photo 56](#)).

4. Repair with ribs paste.

Repairs with ribs paste were accomplished in the fragments that were being assembled, both in the joints and the space between fragments (see [photo 57](#)), considering that this paste, when melted with a soldering iron, provides a greater resistance for movements as well as a greater flexibility (see [photo 58](#)).

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<sup>2</sup> We started using casein glue as adhesive agent, but with the extreme climatic changes that took place during this field season we found that this adhesive was unfit for the functions required, and therefore we replaced it with another one of synthetic origin.

5. Joint repairs with ceramic paste.

Once repairs with ribs paste were completed, we proceeded with fine repair using a ceramic paste (see [photo 59](#)); this paste was also used to complete a number of forms (see [photo 60](#) and [photo 61](#)).

6. Assemblage of *pastillaje* fragments.

Parallel to the process of repairing with the ceramic paste, we began with the process of assembling the fragments of embroidered clay (*pastillaje*) by using Mowithal B60H as an adhesive, to later continue the repairs with ceramic repairing paste (see [photo 62](#)).

Once the assemblage of fragments and the repairing process were completed, we concentrated on the steps necessary for placing a permanent support.

7. Protective cover with aluminum foil.

With the purpose of preventing the resin that was to work as a provisional support from penetrating the stucco, a layer of aluminum foil was placed on the entire surface (see [photo 63](#)) to seal it, and we verified also that the paper had no perforations (see [photo 64](#)).

8. Polyurethane foam layer.

This was uniformly applied on the entire surface of the relief, which had been previously partitioned to hold the resin in place (see [photo 65](#)); once the layer had fully reacted, it formed a hard and enduring surface that absorbed movement, additionally providing the advantage of having the precise shape of the relief, so it did not move (see [photo 66](#)).

On top of the polyurethane foam, a plank was positioned and tied up to the wooden frame, and then the entire stucco panel was turned over (see [photo 67](#)), enabling us to proceed with the necessary treatments on its back, to prepare the piece to receive its permanent support (see [photo 68](#)).

9. Leveling and repairs on the back side.

With the purpose of obtaining a semi-uniform surface in the back, the largest protuberances were mechanically removed with a surgical knife; later, the cracks and fractures were repaired with ribs paste, heating the largest ones with a soldering iron, and treating in the same way every small hole observed in the stucco (see [photo 69](#)).

10. Calcium caseinate layer.

This layer was applied with a brush trying to fully cover every single space with this solution (see [photo 70](#)).

#### 11. Insulating layer.

As an insulating and reversible layer, a cheesecloth cover was applied using calcium caseinate as adhesive agent, and subsequently an additional folded cover was applied using once more cheesecloth and calcium caseinate as an adhesive agent; both were applied with a brush (see [photo 71](#) and [photo 72](#)).

#### 12. Permanent support.

The structure added to the stucco relief, which is its present support, was made of aluminum ribs in a three-dimensional framework (see [photo 73](#), shown above) fit to resist the weight of the panel, and was cemented with a layer of epoxy resins which provide the stucco relief a new museographic support (see [photo 74](#)).

#### 13. Finishing of the edges.

With the purpose of making the support of araldite resins look like stucco, a layer of ceramic repairing paste was uniformly applied all along the edges.

#### 14. Fixing the pigment.

The pigment was fixed so that it wouldn't fade away with the passing of time, as a consequence of abrasion or friction of any sort (see [photo 75](#)).

#### 15. Reintegration of color.

Mineral pigments were used to attenuate the visibility of the repairs so that they would not be obvious to the eye (see [photo 76](#)).

The preservation and restoration works for the stucco relief found in the central pilaster of Structure XIX concluded with the process of color reintegration.



**Photo 42. Placement of fragments found in rubble**



**Photo 43. Placement of fragments found in rubble**



**Photo 44. Placement of fragments found in rubble**





**Photo 45. Placement of fragments found in rubble**



Photo 46. Placement of fragments found in rubble



Photo 47. Placement of fragments found in rubble



Photo 48. Assemblage of fragments forming blocks



Photo 49. Assemblage of fragments forming blocks



Photo 50. Assemblage of fragments forming blocks



Photo 51. Assemblage of fragments and placement in the sand bed



**Photo 52. Wooden frame as a support**





Photo 53. Joining of fragments on both sides



**Photo 54. Provisional supports of polystyrene sheets**



**Photo 55. Joining of fragments**



Photo 56. Joining of fragments

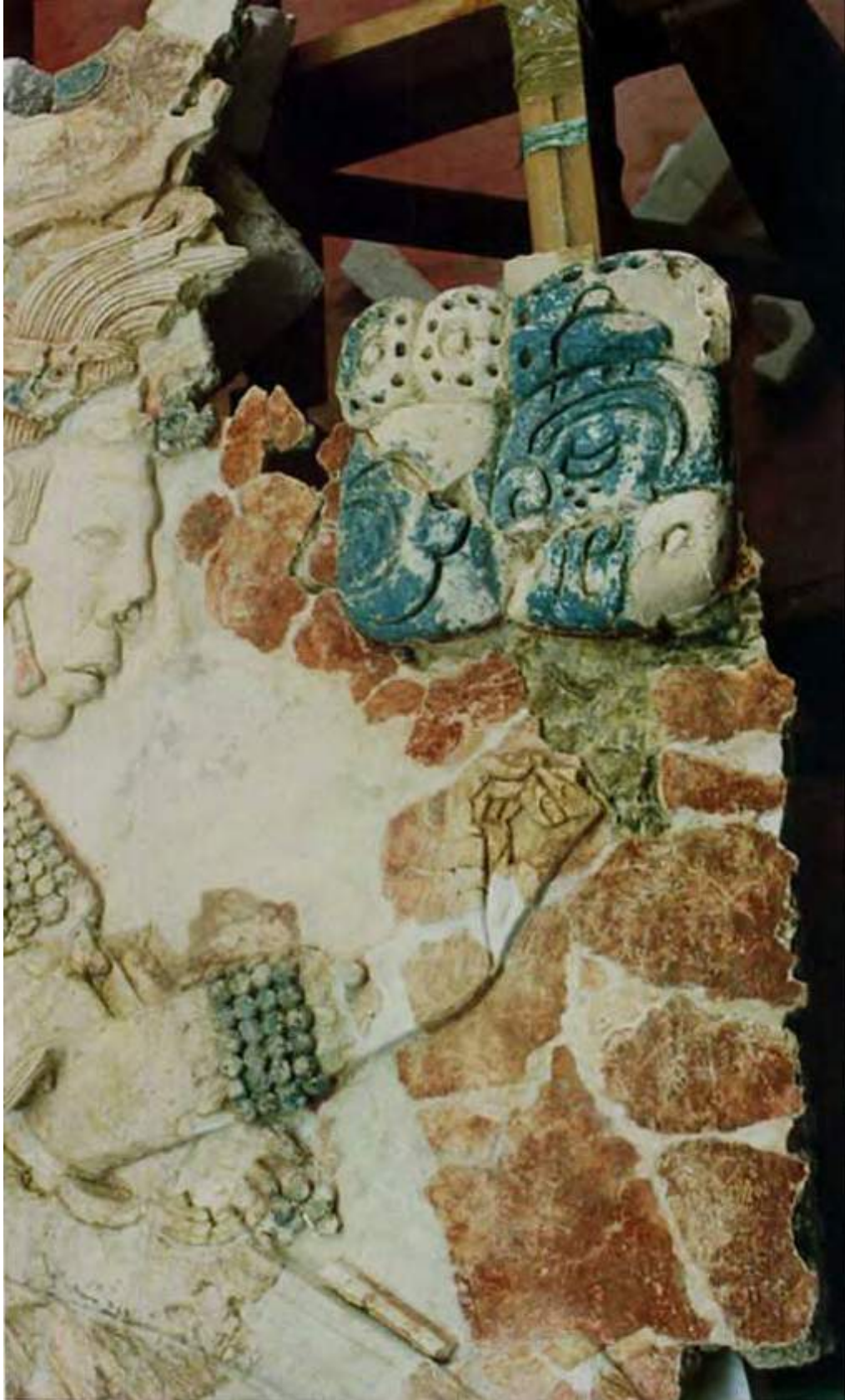


Photo 57. Repairs with ribs paste in the front



**Photo 58. Repairs with ribs paste in the back**



**Photo 59. Repairs in joints with ceramic paste**



**Photo 60. Repairs with ceramic paste**



**Photo 61. Repairs with ceramic paste**



Photo 62. Joining of the *pastillaje*



Photo 63. Protection covers with aluminum foil





Photo 64. Protection covers with aluminum foil



Photo 65. Partitions for retaining the polyurethane foam layer



**Photo 66. Polyurethane foam layer**



**Photo 67. Placement of plank for turning over the stucco panel**



**Photo 68. Reverse of panel. Prior to the repair process**



**Photo 69. Repairs on the reverse of the stucco panel**



**Photo 70. Application of the calcium caseinate layer**

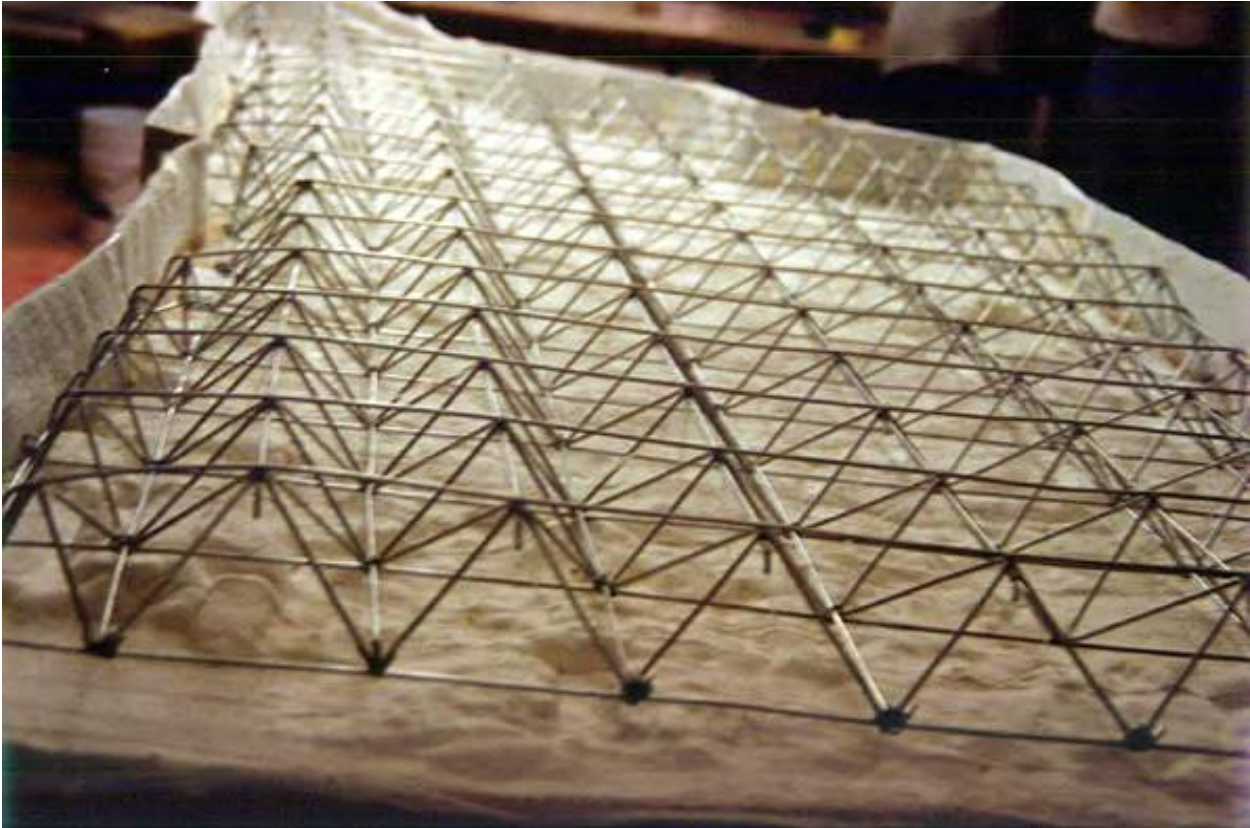


**Photo 71. Application of the reversible layer**



**Photo 72. Insulating and reversible layer of cheesecloth and calcium caseinate**





**Photo 73. Permanent support**

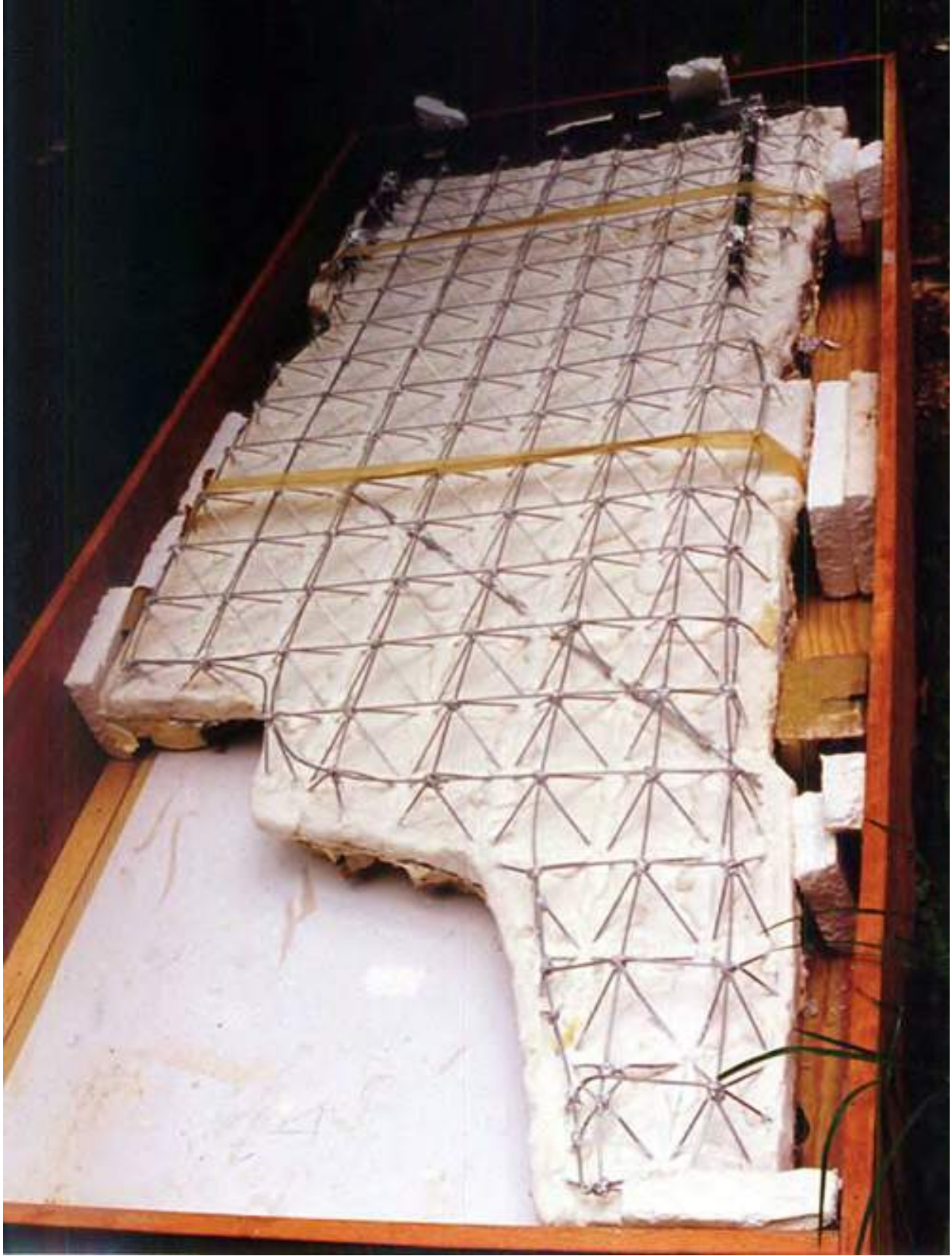


Photo 74. Permanent support with layer of araldite resins



Photo 75. Pigment fixation



Photo 76. Color reintegration



Photo 77. End of process

## **Conclusions**

When the restoration work began, we initially used the traditional materials for the conservation and restoration of mural paintings, however, as soon as strong climatic changes took place, those materials proved no longer adequate for the specific requirements of this piece. One such example was the casein glue, of an organic origin, which started to catch humidity causing the softening and contraction of the glue. Therefore, the decision was made to switch to products of a non-organic origin, products that would not experience a dimensional change that threatened the future stability of the piece.

In the case of the restoration and conservation of a molded stucco relief, this is the first time that a three-dimensional aluminum structure of this kind is used in Mexico, and maybe in the entire world; it is very light, with an approximate weight of 3 kilos that supports nearly 40 kilos of stucco, referring only to the upper fragment, in addition it offers great resistance to movement.

## **Maintenance Recommendations**

- Dust is to be removed only by means of a soft brush or electrostatic duster, while dampened cloths are by all means to be avoided.
- Cotton gloves are to be used for any moving or transportation.
- The attachment of the relief to a wall is to be done through the joints of the three-dimensional aluminum structure, and not through the ribs; in addition, several connecting points will be required.
- Pictures using a flash are to be forbidden, as the flash accelerates the chemical reactions which degrade the component material of the piece.
- It should be kept in stable conditions of humidity and temperature, avoiding sudden changes.

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- [Photo 69.](#) Repairs on the reverse of the stucco panel
- [Photo 70.](#) Application of the calcium caseinate layer
- [Photo 71.](#) Application of the reversible layer
- [Photo 72.](#) Insulating and reversible layer of cheesecloth and calcium caseinate
- [Photo 73.](#) Permanent support
- [Photo 74.](#) Permanent support with layer of araldite resins
- [Photo 75.](#) Pigment fixation
- [Photo 76.](#) Color reintegration
- [Photo 77.](#) End of process