

# **THE CONSERVATION OF OUTDOOR BRONZE MONUMENTS: THE RESTORATION PROJECT FOR THE *MONUMENTO AI MILLE* BY EUGENIO BARONI (1915) GENOA-QUARTO DEI MILLE**

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## **ABSTRACT**

*The Monumento ai Mille, located near Quarto's rock (Genoa) in memory of Garibaldi's expedition, realized by Eugenio Baroni and inaugurated in 1915, is a monument representative of the complex problems connected with the exposure and conservation of outdoor bronze monuments, especially in marine environment. After a complex diagnostic study, managed by ICR chemical laboratory in cooperation with CNR-ISMAR of Genoa, a didactic workshop has been organized in Genoa in September-October 2007. This experience has represented an important moment to give to ICR students of High School of Restoration a training chance to study, to point out and to carry out a conservative intervention; during the work a complete restoration plan of the Monument has been elaborated.*

*The goal of this activity has been to define the restoration project and the maintenance activity guidelines, in accordance with the historic data, technical survey, and non-destructive investigations.*

*In particular the measurement of wet corrosion rate and EDXRF analyses for the studio of the patinas allowed us to choose the best double layer coating (acrylic resin + blend of microcrystalline waxes). This sandwich has been used and tested in a representative area of the monument: the Garibaldi's figure.*

## **THE STORY OF *MONUMENTO AI MILLE***

In September and October 2007 an on-site restoration workshop took place at Eugenio Baroni's massive Monumento ai Mille near the rocks at Quarto (Genoa) from where Giuseppe Garibaldi's historic expedition set sail. The workshop was organised by the Superior Institute for Restoration and Conservation (formerly the Central Restoration Institute [ICR]) of Italy's Ministry for Cultural Assets. The workshop proved an opportunity for study, research as well as for training for third year Higher Training School students on the Institute's specialist courses for the restoration of art works in metal. It was a chance to concretely develop the planning stage within the framework of a didactic worksite, by drawing up a "pilot project" with an aim to undertaking comprehensive action

The project, focusing on the central element of the whole Monument: the representation of the figure of Garibaldi, followed a long and intensive period of diagnostic research to test and verify different possible methods for protection of the bronze. This research project was jointly carried out by the ICR's chemical laboratory, in collaboration with the CNR-ISMAR (National Research Centre-Institute for Marine Sciences) in Genoa, Genoa's Monuments and Fine Arts Service and the University of Salento. A detailed paper on the research was presented by Maurizio Marabelli, and by Giorgio D'Ercoli and Veniero Santin of the ICR's chemical laboratory.

An open competition to find the best draft design for a monument was declared by Genoa city council in 1910. In 1915 Baroni's Monumento ai Mille was unveiled. It is a tribute to the historic expedition of the Thousand and to its leader Garibaldi - in the second half of the 19th century one of the foremost figures and a popular hero of the age of Italian unification known as the Risorgimento which eventually forged one nation from a multitude of small

independent states. Garibaldi disembarked from Quarto outside Genoa with a small group of volunteers (their numbers grew to a thousand by the end of the expedition). They sailed down the Italian coast to Sicily, from where began a military campaign that would see nationalist forces conquer much of southern Italy. The winner of the design competition, the sculptor Eugenio Baroni produced a mold of his group statue which was then cast by the Pasquali steelworks in Pistoia.

The monument was unveiled at a special ceremony on 5 May 1915.(fig.1) Among the speakers was Gabriele D'Annunzio, one of the leading poets and novelists of Italian decadentism, who used the occasion to make an impassioned plea for Italy to join the First World War. In addition to its artistic merit, Baroni's Monument conveys a wealth of historic and symbolic significance which has made it a central element in the collective identity of Genoa and its citizens. Indeed not only for Genoans but for all Italians, who see it as a celebration of the birth of national unification. (1) (fig.1) This fact should be emphasized, as once again demonstration of just how a work of art, especially a commemorative outdoor monument, can assume collective significance for a community – and the consequent importance of protective and conservation measures designed to preserve the work of art in its original location.

There is no more timely debate than that over whether outdoor works of art should be removed from the dangers of atmospheric pollution and brought inside to closed exhibition spaces where optimum conditions may be precisely controlled.

Such a move would be unthinkable for massive bronze monuments like the *Monumento ai Mille*; nor would it be feasible to construct a huge container/display case around the monument itself as this would unacceptably alter its current visual context, where it is the natural focal point for a broad urban space opening out towards the sea. (fig.2-3)

Research leading to the development of improved protective measures for bronze works of art on display in the open air is therefore of fundamental importance. It would help avoid recourse to the production of replicas which then stand in the place of the original works, a measure which has been adopted numerous times including, for example, the equestrian statue of Marcus Aurelius on the Capitoline Hill in Rome, or in Florence the bronze statues by Donatello of Judith and Holofernes and by Verrocchio of Christ and St. Thomas.

Among the jury in 1910 which chose Eugenio Baroni's design was the painter Giulio Aristide Sartorio and the sculptors Domenico Trentacoste and Leonardo Bistolfi, who were among Italy's artistic avantguard of the time. Baroni's design won out over fifty-three other applications from most of Italy's contemporary leading sculptors. The Monument can be seen as part of the international symbolist current, especially as a response to the stylistic developments of Auguste Rodin and Medardo Rosso (particolari in cui si evidenziano questi caratteri). At the same time Baroni also harked back to the characteristics and artistic legacy of the Italian Renaissance, especially Michelangelo's statues - in marble and bronze - where the most recurrent theme is the tension between the block of stone or metal and the form in the act of freeing itself from the material of which it is made. (fig.4) .

Baroni's *Monumento ai Mille* is the transposition in bronze of Luigi Mercantini's patriotic hymn "*The tombs are uncovered, our martyred heroes arise...*". Its focal point is a Garibaldi of heroic and legendary proportions, naked and gazing out to sea. Above him a winged figure (Victory) stretches out its arms above the hero's head to form a symbolic crown of laurel; at

his feet lie a group of heroic fallen male figures, again mostly naked, some still dead others arising from the sleep of death.

Iconographically the *Monument* seeks to represent and to celebrate the men who took part in the expedition, which ended in glory but with a high toll of personal sacrifice. Eugenio Baroni himself emphasised the symbolic nature of the work in a letter to Gabriele D'Annunzio written in July 1919. The nudity of the figures represented in the Monument had drawn criticism; Baroni defended himself thus: "... *the legendary exploit at Quarto was - and is - so distant to me that it was - and is - like a dream of the risen dead, of legendary heroes. ... I know all too well that the Monument at Quarto was viewed with disfavour precisely by the brave veterans of the glorious expedition. ... But it was not made for them, it was made for today's generations and generations to come who will more easily understand its sense of dream, warning and prophecy.*" (2) The Monument, composed of a group of 11 figures, rises from a three-tier stone pyramid. In Baroni's original design the base was higher but following a request from the jury it was lowered to give greater prominence to the figures themselves. Originally the Monument was to be made from Carrara marble and the base from "hard, light-coloured stone", but in 1914 Genoa City Council approved Baroni's request to produce the group of figures in bronze so the work should be more durable. Contemporary documents show the base was made from serpentine marble taken from the nearby quarries at Cogoletto. (3)

## **THE RESTORATION**

As already emphasized, because of its constant exposure to the corrosive action of sea air the *Monumento ai Mille* is a highly representative example of the problems for conservation of outdoor bronze works of art.

The aim of the intervention, the first since the unveiling of the Monument, was to use visual and diagnostic analysis acquired on-site and through laboratory testing to define the precise requirements for restoration, maintenance and conservation. The acquired data was then extended by further analysis of a "sample" section of the Monument, the figure representing Garibaldi. The eleven figures comprising the Monument were produced individually to form a harmonious whole. The figure of Garibaldi was made from eight component parts which were then assembled by inserted fixed joints and welding. Apart from traces of wax from the modelling phase, the surfaces show blowholes, cavities and a number of repair plates near fissures and cracks which were evidently caused by sudden cooling during the casting process. Finishing touches after casting were intentionally limited to the minimum essentials.

The first phase of the project comprised digital photography of the area under examination to provide detailed analysis of technological aspects and the state of conservation (superficial deposits, variations in patina, repairs, etc.).

Prior to the intervention the Institute's scientific laboratories carried out detailed analysis of the alloys used in fusion to ascertain their precise characteristics and the overall state of conservation by analysing corrosion patinas (4) In the sculpture of Garibaldi itself, openly exposed as it is to atmospheric agents and to the marine aerosol, the layers of patinas are mainly thin, unhomogeneous and disfiguring in appearance, with light/grey green coloured zones featuring copper-corroding products (atacamite, paratacamite, nantokite) and zinc (mushistonite-copper stannate) alternating with other areas of brownish-red patinas cuprite. In the protected zones, such as the drapery on the inner legs, on the back and sides of the head, the patinas are thicker, deep green and black in colour.

Subsequently, using the results of the historical, on-site and laboratory analysis, a targeted cleaning programme for specimen surface sections of the statue was established. After which the aims and methods of the conservation project were defined.

The following goals were defined:

1. Removing the causes of structural and surface deterioration. With this goal in mind, the careful removal was undertaken of deposition materials caused by atmospheric pollution. This was followed by treatment of corrosive products, meaning soluble salines present in corroding patinas, as well as surface encrustations affecting the most elaborately wrought areas of the figure.
2. Restoring overall chromatic homogeneity and harmony: to the surface patinas which have either altered or irrevocably replaced those originally produced by the artist, in the areas of highest contrast (mostly concentrated along geodetic lines) and to the numerous repair plates which with time and consequent surface deterioration have become visible.
3. Applying specific protective substances to contrast the onset of further surface corrosion.

### **DESCRIPTION OF RESTORATION PROCESS**

Large areas of the monument were covered with significant deposits of guano. These were removed using pads soaked in heated distilled water (35°C), bristle brushes and cotton swabs. Preliminary washing tests with distilled water were then carried out on surface areas featuring various alteration patinas. Subsequently dust and atmospheric deposits were removed by intensive washing with vaporized distilled water and gentle brushing with soft bristle brushes.

Conductivity tests carried out on the water used for washing showed a gradual lowering of values in test areas during the course of three consecutive treatments. (Table 1)

Next preliminary cleaning tests were carried out on selected areas using 5 different treatments (Table 2) (fig.5).

1. Dry (mechanical cleaning)
2. Tween 201 - 2% in distilled water. (brush) (5)
3. E.D.T.A.2 trisodium solution:- 5 – 10 % in distilled water (compress) (6)
4. Sesquicarbonate of soda solution:- 1% in distilled water (compress)
5. Sesquicarbonate of soda solution:- 3% in distilled water (compress)

The results of the cleaning tests confirmed the findings of the preliminary analysis on the monument's state of preservation; namely that there was a significant range of chemical-physical alteration to the corrosion patinas according to the levels of exposure to atmospheric pollutants. It was therefore decided that the most suitable cleaning treatment would be intensive brush washing with vaporised distilled water alternated with a pH neutral surface-active solution in distilled water (treatment no. 2) with constant conductivity testing of the washing water. For the surface areas with the thickest levels of patina and encrustations localised use of the E.D.T.A. trisodium solution (treatment no. 3) using compresses with visual monitoring was selected. Specific areas of encrustation were also treated with mechanical swabs, micro-drills fitted with bristle brushes and scalpels. All treatments were followed by intensive washing with distilled water, conductivity testing until readings of 10.6  $\mu\text{S}/\text{cm}$  were reached (Table 1. Conductivity readings) and solvent dehydratio(7).

## **APPARENCE – CHROMATIC BALANCE OF PATINAS**

The significant chromatic imbalance caused by the characteristic patina alternations described above (which, moreover, in a relatively brief period of time have radically modified the original appearance of the work) posed the problem for restorers and art historians alike of how best to re-establish overall chromatic homogeneity and harmony while at the same time using technical processes that were both reversible and in line with the principles of preservation.

As in previous restorations of contemporary bronze monuments (8) areas containing old repair plates and geodetic lines on the arms and legs were first treated with a coating of acrylic paint to isolate the metal surface and then with a coat of pigments mixed with solvents (fig.6,7)

## **PROTECTION OF THE SURFACES**

In choosing the protective treatment to follow restoration of the monument it was decided a double-layer system was necessary that would protect the metal surfaces from further corrosion by sealing them off from potentially harmful atmospheric pollutants.

Two different products were applied: first the metal was coated with an acrylic resin containing a corrosion inhibitor. This "active protection" combats – chemically and physically – the onset of fresh corrosion.

For the second layer, the so-called sacrifice layer, a microcrystalline wax was chosen with the properties best suited to defend against the specific on-site conditions (fig.8).

Among the various protective treatments for outdoor bronze monuments, tested since 2001 by the ICR's chemical laboratory and the CNR-ISMAR in Genoa, the two producing the best results were both double-layer systems: Incralac+Soter and Incralac+R21. In this case Incralac+R21 was deemed the best solution.

Although treatment with Incralac+Soter had provided slightly lower readings for the onset of corrosion in areas with particularly porous patinas (area BB), Incralac+R21 was chosen as the best overall choice for three fundamental reasons:

- The high stability levels offered by R21 wax, especially its resistance to softening up to 105°C.
- A more harmonious aesthetic appearance. R21 Wax softens the "soaked effect" on metal surfaces caused by the preceding application of acrylic resin and leaves a shinier overall appearance. Soter causes surface darkening.
- Easily reversible: R21 provides an efficient protective barrier for the acrylic resin and, as it is easily removable, it facilitates any eventual maintenance and repair. Whereas preliminary testing of Soter (see above) showed removal was difficult with the passing of time.(fig.9)

## **CONCLUSIONS**

Once the restoration had been completed, sampling of the speed of corrosion was taken on the entire statue of Garibaldi (the results of which are to be soon published) so as to obtain a metric evaluation of the intervention as well as of the effectiveness of the protective treatment. On this basis, the requirement to ensure the monument may be enjoyed in its historical context and urban setting, be it in rather vulnerably exposed microclimatic and

pollutant conditions, on the one hand, and the foremost need to preserve it, do appear to be reconcilable.

The decision to carry out restoration work and apply protective products so as not to alter the sculpture's patinas' colour balance and its luminosity, therefore appear to be sustainable.

Bearing in mind the environmental conditions and the monument's construction (assembled blocks, geometry, surface finish) the finalised restoration work should possibly be followed by a carefully programmed diagnostic maintenance plan

### **ACKNOWLEDGMENTS**

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S.Federico, E.Hubert, E.Prunas, E.Senatore (restoration team of the workshop in Genoa-Quarto sett.ott.2007), M.Marabelli, G.D'Ercoli and V.Santin, for their collaboration, S.D'Amico, for the survey of the Monument carried out by scansion laser 3D, and A.Rubino for photographic reproductions.

Many thanks also to the Higher Training School students on the Institute's specialist courses for the restoration of art works in metal.

### **ENDNOTES**

1. See M.F.Giubilei, C.Olcese, *Da Rodin a D'Annunzio: un Monumento ai Mille per Quarto*, in the Catalogue of the exhibition '*Garibaldi il Mito. Da Rodin a D'Annunzio un Monumento ai Mille per Quarto*', Genova 2007,pp.14-64
2. Letter dated 3 July 1919 from Baroni to D'Annunzio published in V.Terraroli, '*Gli eroi risorgono con un ritmo di marea*' *Gabriele D'Annunzio, Eugenio Baroni, Ettore Cozzani e il Monumento ai Mille sullo scoglio di Quarto* ', in the Catalogue of the exhibition, Genoa 2007, p.76
3. Information from M.Flora Giubilei, *Un Monumento ai Mille.Cronologia dei fatti*, in the Catalogue of the exhibition, Genoa 2007, pp.176-182
4. See the paper by M. Marabelli, G. D'Ercoli, and V. Santin in the notes to this Convention.
5. Surface-active agent with neutral pH
6. Sodium salt of etilendiamminotetracetico acid
7. Ethyl Alcol + acetone 1:1; pure acetone .
8. See notes from I.M.Marcelli, *Il restauro del cavallo Morente di Francesco Messina in 'Monumenti in Bronzo all'Aperto – Esperienze di Conservazione a Confronto'*, P. Letardi, I. Trentin, G. Cutugno, Firenze 2004, pp.155-162

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1. *Eugenio Baroni 1880-1935*, Catalogue of the exhibition, F.Sborgi, Genoa 1990
2. M.F.Giubilei, C.Olcese, *Da Rodin a D'Annunzio: un Monumento ai Mille per Quarto*, in the Catalogue of the exhibition '*Garibaldi il Mito. Da Rodin a D'Annunzio un Monumento ai Mille per Quarto*', Genova 2007,pp.14-64
3. Ph.Dent Weil, *Patina from the Historical-artistic point of view* in '*Monumenti in Bronzo all'Aperto – Esperienze di Conservazione a Confronto*', P. Letardi, I. Trentin, G. Cutugno ed., Nardini editore . Firenze 2004, pp. 39-48
4. M.Mercalli, *Storia del concetto di patina. Riflessioni teoriche intorno al restauro dei manufatti in bronzo* in '*Monumenti in Bronzo all'Aperto – Esperienze di Conservazione a Confronto*', P. Letardi, I. Trentin, G. Cutugno ed., Nardini editore . Firenze 2004, p.49

5. I.M.Marcelli, *Il restauro del cavallo Morente di Francesco Messina* in 'Monumenti in Bronzo all'Aperto – Esperienze di Conservazione a Confronto', P. Letardi, I. Trentin, G. Cutugno, Firenze 2004, pp.155-162
6. R.Mazzeo, *Patine su manufatti metallici*, in 'Le Patine. Genesi, significato, conservazione.' Workshop promoted by M.Matteini, Kermesquaderni, Firenze 2004,pp.29-43

#### MEASURES ELECTRICAL CONDUCTIVITY (1)

Table 1.		
1/10/2008		
Head and chest		
	I washing	23 $\mu$ S/cm a 25°C
	II washing	18 $\mu$ S/cm a 25°C
	III washing	14.6 $\mu$ S/cm a 25°C
Full body		
	I washing	68.2 $\mu$ S/cm a 25°C
	II washing	48 $\mu$ S/cm a 25°C
	III washing 1	43.8 $\mu$ S/cm a 25°C
2/10/2008	After cleaning Tween 20 - 2% in dist. water	
Full body		
	I washing	70 $\mu$ S/cm a 25°C
	II washing	60 $\mu$ S/cm a 25°C
	III washing	44 $\mu$ S/cm a 25°C
4/10/2008		
Full body		
	I washing	57.6 $\mu$ S/cm a 25°C
	II washing	22.3 $\mu$ S/cm a 25°C
5/10/2008		
Full body		
	I washing	17 $\mu$ S/cm a 25°C
	II washing	15 $\mu$ S/cm a 25°C
	III washing	9.9 $\mu$ S/cm a 25°C
Left arm		
	I washing	5 $\mu$ S/cm a 25°C
10/10/2008		
Left leg (internal)		
	I washing	8,9 $\mu$ S/cm a 25°C
Right Leg (internal)		
	I washing	13.5 $\mu$ S/cm a 25°C
In between legs area		
	I washing	15.00 $\mu$ S/cm a 25°C
11/10/2008		
From the side to the feet		
	I washing	32.7 $\mu$ S/cm a 25°C
	II washing	12.6 $\mu$ S/cm a 25°C
From the head to the side		
	I washing	42.4 $\mu$ S/cm a 25°C
	II washing	15 $\mu$ S/cm a 25°C
12/10/2008		
From the side to the feet		
	I washing	13.7 $\mu$ S/cm a 25°C
	II washing	7.8 $\mu$ S/cm a 25°C
After washing with soft brush		
	III washing	11,5 $\mu$ S/cm a 25°C
From the head to the side		
	I washing	17 $\mu$ S/cm a 25°C
	II washing	11,7 $\mu$ S/cm a 25°C
After washing with soft brush		
	III washing	18,6 $\mu$ S/cm a 25°C
17/10/2008		
Full body		

After washing with brush		
	I washing	36.4 $\mu\text{S}/\text{cm}$ a 25°C
After washing with soft brush		
	II washing	17 $\mu\text{S}/\text{cm}$ a 25°C
	III washing	10.6 $\mu\text{S}/\text{cm}$ a 25°C

(1) For each washing across full body 20 lt distilled water used.

**Table 2.**

## CLEANING TEST

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### PLATE 1

Area: shoulder (right)

Treatment: Dry (mechanical cleaning)

Number of treatment: 1

Treatment time: 10 min.

## CONDUCTIVITY TEST

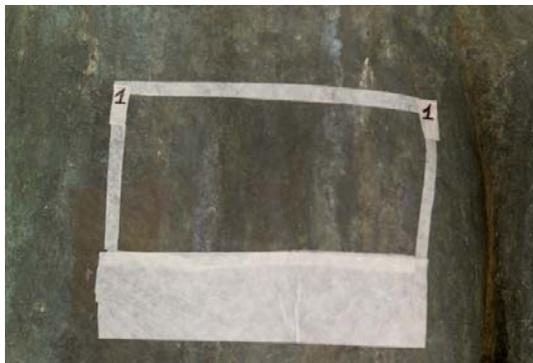
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Washing solution: distilled water (100 cc)

Treatment time: 15 min.

Start conductivity : 17  $\mu\text{S}/\text{cm}$  a 25°C

End conductivity: 10,6  $\mu\text{S}/\text{cm}$  a 25°C



*Plate 1 – before treatment*



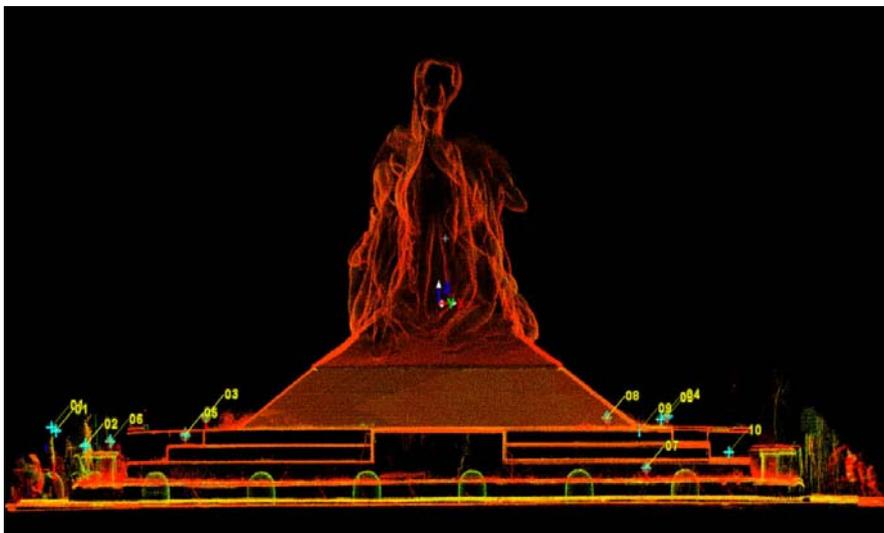
*Plate 1 – after treatment*



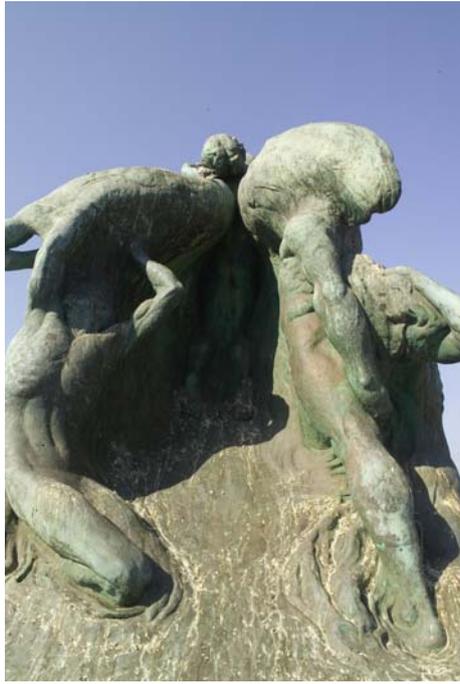
*Fig.1 The inauguration of the Monumento ai Mille, 1915, Archivio Comune di Genova*



*Fig.2 The Monumento ai Mille before restoration, sett.2007*



*Fig.3 The survey of Monumento ai Mille carried out by scansion laser 3D(arch.S.D'Amico ISCR)*



*Fig.4 The Moumento ai Mille, particular*



*Fig.5 The cleaning test*



*Fig.6-7 A Monument's particular without and with a coat of pigments mixed with solvents.*



*Fig.8 The protective treatment*



*Fig.9 The Garibaldi's figure after the restoration*

[Back to Top](#)