POMPEII SUSTAINABLE PRESERVATION PROJECT

Monica Martelli Castaldi – *Consultant Conservator-Restorer*

SOPRINTENDENZA SPECIALE PER I BENI ARCHEOLOGICI DI POMPEI ERCOLANO E STABIA

POMPEII SUSTAINABLE PRESERVATION PROJECT
PSPP

NECROPOLIS of PORTA NOCERA

2nd Conservation Campaign – 2015
and

SUMMER ACADEMY 2015

7 September - 3 November 2015

General overview and report of the activities

by Monica Martelli Castaldi, Consultant Conservator-Restorer

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Results from the survey in 2014:

The survey done during the first campaign of the Pompeii Sustainable Preservation Project, in September – November 2014, evidenced several weak points in the Necropolis of Porta Nocera, which are important for its preservation. The need of a structural survey was pointed out as a safety measure, the importance of understanding the movement of the rain-water along the Via Nocerina and over the tombs' surfaces was also suggested, but the main problems lay on the decorative features covering the walls.
These decorations are mostly made in "stucco", which means several layers (generally 2 or 3) of slaked-lime plaster with white aggregate (limestone and/or marble powder, with increasing granulometry), covering the walls to imitate marble slabs or to create delicate bas-reliefs ornaments and architectural cornices.

The major problems highlighted for these surfaces are due to salt crystallization. The crystallization happens over the surface, but also below it, in-between or inside one of the preparatory levels. In this case it produces the disintegration of the mortars, the detachments of large areas of plaster, or the flaking and bubbling of the very delicate and smooth final finishing layer of the surface.

As usual in the majority of the archaeological sites, all plasters suffer from the effects of rising humidity coming from the soil, but in the case of the Porta Nocera surfaces, the problem is also due to infiltrations of water coming from the top of the tombs (due to lack of maintenance of roofs and coverings) or from the environment as rain water runs over the surfaces in winter. A further problem is the very high temperatures concentrating over the surfaces exposed to the sun irradiation, during the summer.
Tourists, touching and scratching the walls and removing small fragments, is also a problem, which will be reduced when the surfaces will be consolidated.

Aims of the 2015 campaign:

The most important activity identified by the 2014 survey, as one immediately needed in the Necropolis, was to approach emergency operations, to save the remains of the original stucco plasters and decorations, so unstable and fragile, there was a high risk of the crumbling of large portions and the complete loss of many of the few remains still in place. This is why, the Project has launched, for the year 2015, the first PSPP Summer Academy, to specialise young students, or young professionals, in the specific issues of the conservation of architectural surfaces and decorations in archaeological sites.

This is a very particular field of conservation, which demands well established and reasoned criteria, to adapt the view, the materials and the already tested conservation methodologies, to the difficult situation of archaeological sites, where the exposure of the surfaces to the natural elements is inevitable and where the subsequent reactions and consequences on the artefacts simply happen every single day of the year. The action and the reactions of the exposure to the elements have to be somehow contained, or at least controlled, but this is not easy and, sometimes, impossible.

The conservation of surfaces in archaeological sites is not yet conceived at university level as a specific and definite carrier. It is therefore quite important that the PSPP Summer Academy is able to offer to the students the occasion to practically explore the several issues coming into play when trying to preserve the Necropolis, and trying to ensure the life of its decorative coverings.

The participants to this 2015 first Academy, were chosen after a careful and not easy selection. The group was international, the provenance was varied, the level of experience was expressly uneven, allowing the

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participants to be enriched by all questions and all contributions coming from the colleagues and from the professors, in an open and interesting dialogue. The collaboration was in fact deliberately kept on an equal partnership level, in such a way the discussions were fruitful and productive.

Work program for the 2015 campaign:

The work was run with the students along eight weeks, from the 9th of September to the 3rd of November.
The starting point has been a three days initial workshop, aimed to update and inform the participants about the Project, about the works going on in the Pompeii archaeological area by the Soprintendenza and about the works achieved in the past years by the Herculaneum Conservation Project (a similar project that has been running since 2003 in the archaeological site of Herculaneum).

Another workshop was held at the end of the campaign, on the 2nd and 3rd of November, with the finality of closing the course, informing the Soprintendenza of the results of the work achieved and to establish a common view to plan the possible follow up of the works.

Identification of the actions to be done during the Summer Academy 2015:

Since the beginning, the participants were "placed" into the reality of how a restorer can manage the decisions for an archaeological site: where to start, how and what to do, to preserve an object so complex and fragile as an entire necropolis, like the one in Porta Nocera.
No information was given at the beginning, apart from the general overview received in the first workshop about the archaeological site of Pompeii and about the similar project in course at Herculaneum.
Equally, the previous report with the results of the conservation survey done in the site in 2014, was not given to the participants at the beginning of their observation, but only at the end.

In this way, during the first week of course, the students were divided in small groups to walk around in the Necropolis of Porta Nocera (and in the other part of the necropolis, in the so called area of Via Nocerina) to learn from the site and listen to its requests, looking at it from a "bird-view" perspective and considering it as a single "big object".
This meant, reporting on how the whole street of the necropolis behaves in relation to the rain water movement and disposal; how do the single tombs perform with water, according to their faces, North, South, etc.; how does the sun hit these surfaces, for how long and in which amount, to establish how important is the surface heating in the different seasons; if there are different kinds of tourists visiting the area, which are the preferred paths taken by the groups and which are the risks caused to the surfaces during the visits, etc.

A final agreement about each of the conservation issues was reached only after the collection of the aforementioned various observations and discussions within the groups and the professors,. The students could then define the operations to be done and which kind of organization was required to implement them: if scaffoldings were needed and where, which points of discussion had to be approached to define the methodologies and the materials to be used and which kind of decisions needed further discussion with the Soprintendenza technicians or maybe scientific investigation to be done on samples or on site.

As a second step, the participants were asked to write down the order of priorities in the execution of the interventions, to know which were the most urgent operations to be done and where. This was a difficult step with long and complex discussions opened to define how to take decisions and who is in charge of those decisions, analysing roles and responsibilities of the several professionals acting in the field of preservation.
To proceed with the work (during the 2nd week), the participants had then to list materials to be purchased, divide the group in small teams with defined areas or operations to be done, had to organize for the sequence of building up of scaffoldings (which was done by another group of workers) and had to define a concrete plan of work with daily expiring achievements to be respected, in view of the short time of the campaign and the many interventions to be done.

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This work plan was revised and modified at the end of every working week, showing to the participants three difficult issues typical of this kind of works: how more damage can "appear" while working (consolidations can last much longer because the detachments are larger or deeper than foreseen), and how the technique of practical realization of each single operation can change or have to be slightly modified according to the needs of the surface and how all has to be related to the weather, programming the operations according to the forecast of the next day or protecting the surface recently treated in case of possible rain, strong winds or too much heat.

During all the above mentioned steps, the observation collected were transferred on "site-thematical-maps", for which the participants had to choose the division in topics and the kind of legend and symbols to be used. Some discussions were held about the use of documentation and about its importance for the understanding of the object to be restored.

At the end of all this preparatory work, the 2014 survey maps of the site were distributed, to allow the participants to compare the information collected by the "experts" and to see if the data identified a year before were matching with the present situation or if there was any possible updating or correction to be added.

Very useful discussions were held at the end of each day or, if required, during the observations.
The students were always free to ask for a confrontation with the teachers, to propose their own points of view or suggestions, which were in general accepted, or in some cases openly refused, with the due explications.
The referents for the Soprintendenza, the inspector archaeologist Annalisa Capurso and the restorer Stefania Giudice, were periodically consulted and all decisions, once agreed inside the team, were transferred to them to obtain the final approval.

As said, from the 2nd week on, the work moved into defining with major detail what had been identified in the initial week of survey. The materials were tested, the final choices were made and the operations were programmed.
An important contribution was given in the tests phase, by prof. Klaus Klarner, who showed to the participants how to prepare a special "foam mortar", to be used for the very large detachments, where the material to be injected has to be resistant but light. Prof Klarner also discussed with the participants the methodologies to keep in place very fragile areas, at risk of collapsing during the consolidation operations, but without facing them with an adhesive. In order to keep the surfaces 'free to breath' as much as possible, in any moment of the intervention, several kinds of pins, nails, nets and cables (in natural or synthetic material) were shown to the participants to demonstrate how to apply localized propping systems to keep the fragments to be reattached or consolidated in the correct position.


Preparing the foam and adding the hydraulic lime mixture to create the hydraulic foam to be injected in the detachments of the plasters.

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Various moments of the experiments with prof Klarner, to evaluate the results of different kinds of mortars for the filling of lacunae in the "stucco" plaster.

Different ways to secure collapsing fragments using synthetic or natural fibers and various kinds of nails and pins.

Lunch during the experiments in the laboratory-deposit house.

Prof. Jurgen Purshe was also with the team for two weeks. The participants re-discussed with him the approaches undertaken until his arrival, and were able to re-consider all the procedures from a different point of view. Most of the tests for consolidation and plastering were checked and some modifications were made to the process.

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Professor Purshe, during the application of a layer of cotton gauze with Cyclododecane, as a protective coating to keep in place very fragile areas.

The students discussing about the decisions to be taken.

The students and prof. Purshe listening to the archaeologist Pia Kastenmeyer during the visit to the Herculaneum archaeological site.

In the last two weeks of the campaign, the students had the opportunity to work with prof. Neva Polosky, a restorer from the university of Zagreb, who mainly worked with the team in via Nocerina, but shared her points of view and experience during the common discussion. This was an important occasion for the participants, as the kind of economical (but also political and social) problems that Croatian restorers and students have to face, are definitely very different than what we usually find in our universities and social media.

During the entire course, the weekly work was supervised by the archaeologist Pia Kastenmeyer, who was able to give response to the different questions raised by the participants, in order to take the correct conservation decisions in relation with the archaeological information available.

My role, as consultant restorer, was to follow the participants from the conservation point of view, together with the invited professors, guiding the survey of the Necropolis and the consequents decisions, in relation with problems, needs and specificities of the archaeological sites.
The bird-eye overview and the consideration of the site as a whole are the result of the experience I gathered working in the Herculaneum Conservation Project and with ICCROM in other archaeological sites. This campaign and the many moments of discussion, with such a special group of participants, presented me the chance to reflect and revise my personal knowledge of the subject, which was an important gift from the 2015 work.

Organization of the team and of the practical work:

The final decision taken by the group (considering the emergency needs, the difficulties, the time available, the possibilities of building scaffoldings, etc.) has been to concentrate the work in two areas of the Necropolis.
At the beginning, another possibility was considered, thinking of a series of "spot interventions" to be done all around the site, to block the collapsing areas and to avoid losses, but this idea could not be approached, because of several difficulties with the construction of the scaffoldings and because of the short time available in the campaign.

The larger number of participants, 6 restorers, was concentrated on five tombs named as PN_EN_4, 6, 10, 12 and 14, placed on the East northern side of the Necropolis. These tombs, are indeed very damaged, but have still a considerable amount of decorations over their surfaces; although much less, in comparison with how they were found when recently excavated.

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View of the tombs in the central part of the necropolis, during the mounting of the protective fence to close the worksite area.

The damage of the surface of the stucco plasters, due to salt crystallization.

Three moments of the emergency interventions to secure very badly detached parts of the decoration.

Another team, composed by 3 restorers, worked in the last part of the Necropolis, the so-called Via Nocerina area. Here, two tombs were treated, VN_N_A and VN_N_F, with dramatic detachments and powdering of the internal layers of the plaster and with a collapsed portion of plaster to be reattached. The tombs were chosen for treatment because in next year a new archaeological digging will start at close contact with some of their surfaces, demanding an urgent consolidation of the powdering material and the filling of the deep empty layers, to avoid damages during the upcoming excavation operations.

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The area of Via Nocerina, with the emergency works on the most damaged part of tombVN_N_A

Interaction and friendship among the participants were easy since the beginning and this was reflected in a sincere dedication to finish the decided work despite the weather, which at some point started to change.
It is important to say that in this Summer Academy, we could count with a particular group of participants.
They were simply adorable, as concerning the personal attitude, but also were extremely precise and professional from the conservation point of view, as they were all serious, committed and well prepared.
The different preparation they had received in their Universities, or the varied experiences collected by some of them in working after their studies, allowed an open exchange and a sharing of knowledge and experiences.
Some of them had a natural capacity of leading the others and for this reason they were selected as "referent" for the two working areas, to report in the common discussions (and to me, to Pia Kastenmeyer or to the other restorers in charge at the moment), in such a way no information was missing.
The organization and purchase of materials was also entrusted to two of the participants, as well as, the small-localized actions to organize short or long propping, when needed, or to move the scaffoldings and adapt them to the areas to be treated.
The general idea was not to have just a teaching/learning experience, but to accomplish a real concrete work for the site, doing as much as possible in the short time available and learning from this the basic criteria to be used for decorative features in archaeological sites.

About the approach and the adopted criteria:

According to my experience, the first problem for the preservation of archaeological sites is that the professionals in charge have to realize that conservation methodologies and criteria cannot be used strictly as used in other contexts. They have to be adapted to the single site and to the situation.
Apart from some fix and basic considerations or rules, these changes have to be done each time in a different way. Archaeological sites are at the same time delicate and fragile structures, but also incredibly strong systems, able to resist for centuries to the worst conditions possible for preservation, and still able to bring to our days such important examples of the civilizations of the past.

The most important issue when working in an archaeological site is to analyse the different elements in action, referring not only to the single monument to be treated, but to the whole which surrounds the surface to be treated. To understand the water is crucial, its origin, its collection, the existence and use (or the not-use) of the original hydraulic systems, the restoration water collection systems, are all very important issues.
Furthermore, it is also important to study the levels and slopes of the ground, trying to imagine (if not possible to be on site on rainy days) where and how the water moves. In some sites the major problem is not the water, but the wind, or the sun irradiation; in some other the weather action is acceptable, but the problems raise from the visitors, etc. The points of view of who is in charge of the preservation have to change according to the

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object to be treated and in this cases, the object is definitely a large and intricate complex of architectural structures, renderings and decorations, over the walls, the floors and sometimes even the ceilings.

In archaeological sites, water, salts, sun radiation, other weathering agents and bio deterioration are the elements with which restaurers must learn to live. To get rid of them completely is possible only in very few occasions, but through very heavy and expensive interventions, which we know are not easy to be funded by the governments.
The "ordinary" situation is that we have to live with these elements, which will continue to cause damages to the surfaces. And we can do so, only if we very carefully study the site and we manage to really know it and slowly understand its behaviour.

For these basic reasons, we decided to use one entire week of the campaign to be sure that these new professionals will know how to listen to a site and how to receive from it the information needed to preserve it.
The approach we have tried to transfer to them is that the surfaces find equilibrium along time, they find it with many difficulties their own way to resist to the damaging agents. The decorations we receive from the past were carefully crafted, materials and techniques were chosen to be resistant and the artisans knew the best way to apply them. For this reason they reach us, to tell us about all this knowledge from the past.

Being able to respect this ability of the materials and the decorations to gradually adapt to their environment is very important to avoid the introduction of significant alterations to the system, or if needed, to do it progressively.
By the definition of "system" I here intend the set of interactions, formed over time, between the components of an architectural decoration, which are: the structure, the preparatory layers, the surface finishing, the surrounding environment and the general context where this decoration lives.

Also, it is important to understand the value of these surfaces, and the people or the "group of interest" which are involved with this value. It is important to analyse the context where these works of art live today and which are the real deterioration factors. And it is important to find in the surface the areas in good conditions, because these will be the reference to which we have to tend. No restoration or conservation intervention can be decided from outside, following the modern criteria or methodologies. No good preservation will ever be possible without a perfect knowledge and understanding of all the elements aforementioned.

About the choice of materials:

Certain materials, generally used in conservation as consolidants or protective coatings, can considerably reduce the porosity of the system and change the capacity of the layers to react and breath as a whole. The scientific research in conservation has well developed in the last decades, substituting these organic consolidants by inorganic ones, which don't alter the physical properties of the components of the decoration and don't reduce as much the porosity. This precaution will allow liquid water and water vapour to move inside the layers, towards the air, bringing along the soluble salts, which will then tend to crystallize preferably outside the structure.

The basic criteria onto which to support the emergency interventions in the necropolis were chosen to be similar to those developed and tested during the HCP project in Herculaneum: no organic conservation materials but only inorganic, weak mortars to age and move together with the original ones;, fillings of the lacunae (missing parts) done without pressing the mortar too much, keeping it fragile and porous to behave similarly to the original aged one; consolidations without completely filling the empty detachments, but only creating "bridges" to avoid the collapsing of the surface, etc.

Regarding the reduction of the powdering of the plasters, nano-consolidants have demonstrated to be very useful. A kind of nanolime (NanoRestore by CTS) has performed very well in this kind of operation, repeating the application according to he need. A nanosilicate (Nano Estel by CTS) has also given good results.

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The detachment of the layers has been solved injecting hydraulic mortar. To be able to fill very large detachments, without inserting too much water and too much weight, a special "foam mortar" was introduced by prof. Klaus Klarner. After several test, all the students managed to produce the correct thickness of foam and to use it. The preparation of this foam is not always easy, because of the need of electricity and some kind of sensitivity to changes in temperature and humidity, but the results were very good and the foam aroused great interest in the restorers of the Soprintendenza. Also, the different examples of propping systems, found their use on the stucco surfaces of the EN tombs in the Necropolis, before and during the injection of the foam.

In some areas the plaster layers were opened and deformed. Re-positioning these parts was apparently not easy and not doable, but giving the material time to soften, slowly and gradually pushing the areas back to their original position, the replacement was done, with the help of small wooden prop,s which were slowly pushed where needed to readjust the plaster to its place.

One of the more difficult problems in the preservation of architectural surfaces in archaeology is the flaking of the surface layers. This problem happens over mural paintings, stucco surfaces and over any kind of rendering, with different kinds of appearance, from small tiny bubbles to wide bubble reliefs, from thin curling detachments, to small or large hard flaking of the superficial layer of the decoration.
This form of degradation is extremely frequent and it is still unsolved now.
This problem is generally due to the crystallization of salts, which in this case happens just underneath the thin surface of the decoration. According to the kind of salts, the material and the kind of finishing of the surface, but also to the presence of consolidating agents impregnating the superficial layers, the damage starts and continue until the total loss of the decoration. In my opinion, this is the worst problem for mural paintings preservation in archaeological sites. When approached in the past, it has been treated using repeated applications of a synthetic resin or natural glue, which rendered the surface waterproof and generally improved the damage. When not approached, the most frequent case in the last years, the problem remains unsolved and the decay continues.

To approach the problem, we proposed a methodology which we have recently tried and which has worked very well: the internal surface of the bubbles has to be wet with alcohol and water, then, when the material starts to respond, the consolidating agent is injected. As the separation of the scale, or flaking or bubble, is sometimes quite large (from a few millimetres to 1 cm) a liquid consolidant is not enough, something thicker is needed.
We have tried with Nanolime (NanoRestore) plus nano-silicate (Nano Estel). The action of the two products together, creates a transparent GEL, which fills the spaces and slowly continues its reaction and hardens keeping the flake and the surface together but also filling the void which sometimes remains if the flake is too hard to be pushed back to its position.
The gel is inorganic and will not change the physical properties of the surface, allowing the passage of water and air. This is a result, which, to my knowledge, it hasn't been possible to reach without using an organic product.

What is needed in the Necropolis in the future:

Next camping will have to continue as follows, possibly in this order:

1. Review and updating of previous maps and documentation of conservation issues
2. Control of the areas treated in 2015
3. Continue with the emergency works, ensuring that all collapsing areas are fixed, possibly working both with a "spot interventions team" and one or two "local-interventions teams", in order to finish from priority 1 areas to the lower priority ones.
4. Finish with the collection of the fragments of original plaster around the tombs.
5. Inspection and clear mapping of the movement of water over the ground (around the Necropolis, on the Via Noceria and around and over the tombs) and consequent list of priority actions to reduce the water in proximity of the tombs (at least for the stucco or mural paintings decorated ones). Also the water coming from the Via Plinio area.
6. Implementation of the works to collect and regulate the water movement in the necropolis.

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7. Opening of a research study program, with scientific support, for the problems of the surfaces for the re-adhesion of the flaking paint layer or stucco surface finishing, with an archival study of the state of the art (including GPP Grande Progetto Pompei last interventions) and with more comparable tests on site with Nano-Lime/Nanosilicate gel treatment, and with other consolidants.
8. Inspection by a structural engineer, with list of priorities for small (or big) structural interventions.
9. Implementation of masonry/conservation works:
   - cornices and other architectural parts where stones and bricks are loose (dangerous for surfaces and visitors)
   - repair of external surface of roofs and covering (or remake of these protective roofs)
   - check and re-establish/re-open the original (or restoration) water collectors, but ensuring that the water is also collected at the base of the monuments and brought far from the walls
   - any small work for collecting and moving water away from the walls

   NOTE: these activities could be done also as a 2nd type of Summer Academy, for masons and specialized workers, coming from the firms working in the region or from any other EU or Eastern country. It could be also done at international level, with the support of ICCROM, as a specialization course to improve the young people return to these kinds of manual activities, learning them expressly for conservation).

Pompei, 11th of February 2016

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