

The Necropolis of Petosiris at Tuna el-Gebel

Final report of the season in spring of 2018

1. The field school for restorers (co-operation of the Ministry of Antiquities (MoA), Minya University, State Museum of Lower Saxony Hanover/Germany and supported by the University of Applied Sciences HAWK in Hildesheim, Germany)

This field school was part of the “International Summer- and Field-School Program for Archaeology, Conservation and Restoration of Arts and Cultural Heritage” and is financially supported by the Volkswagen Stiftung, Germany.

We held this field school in memory of Prof. Dr. Nicole Riedl-Siedow, who passed away in August 2017. Due to her sudden death this field school had to be postponed to February 2018. This was also the reason that sadly the German students could not participate any more.

1. Members of the field school:

Prof. Dr. Hussein Mohamed Ali Ibrahim, conservator (Minya University)

Dr. Silvia Prell, egyptologist (assistant director and coordinator)

Dipl.-Rest. Heike Pfund MA, conservator (supervisor)

Dipl.-Rest. Friederike Funke, conservator (supervisor)

Moustafa Retib Mourad, Ines (inspector MoA)

Adel Ezat Fahmi, Hysam (inspector MoA)

Reda Zareh Moosa, Rafik (Minya University)

Hesham Ali Shady, Esraa (Minya University)

Ezak Khalil Saleh, Marym (Minya University)

Mamdouh Maroof Mobark, Nada (Minya University)

Ahmed Adham, Nagla (Minya University)

Salah Abd El Salam Abdo, Rasha (Minya University)

Mahmoud Mohamed Ahmed, Sally (Minya University)

William Abd Al Shahid, Wassim (Minya University)

Boshra Maltly Makar, Mamdouh (MoA)

Salah Ali Mahran, Mohamed (MoA)



2. Introduction

From February 21st to March 11th, 2018, the above mentioned team worked at some of the most endangered wall paintings of the tombs of the human necropolis of Tuna el-Gebel performing at the same time a field school for conservation on site.

Our thanks go to the Ministry of Antiquities (MoA) for the permission to work to protect the site and for allowing us to stay in the rest house near the site.

Furthermore, we thank Mr. Shehab Hussein, general director of restoration of Middle Egypt (MoA), and our inspectors Mrs. Ines Moustafa and Mr. Hysam Adel for their most friendly encouragement and help.

The work to protect the site would not have been possible without the kind co-operation of Prof. Dr. Hussein Mohamed and the Dean of the Faculty of Fine Arts, Prof. Dr. Mohamed Ibrahim Hashim, both from Minya University. Special thanks go to the president of Minya University, Prof. Dr. Gamal el-Din Abu el-Magd for his great interest and support.

The trainees of the field school worked in five different areas, both roofed and non-roofed. These were GB27=M9 facade, GB24=M09/SE antechamber and room, GB16=M6/SS first room and GB13/M5/SS first room.

3. Background

In 2009 the wall painting conservator Alexandra Winkels, expert for Egyptian wall paintings, undertook the first steps to preserve endangered painted plaster on site. This was also the first step to develop a master plan for emergency conservation of the wall paintings.

In 2009 Ms. Winkels familiarized with the historic materials and phenomena of decay and concentrated on the conservation of the tomb pillar of Hermokrates in GB20 (see Final Report 2009).

In 2010 Prof. Dr. Nicole Riedl joined the team and developed the conservation approach further together with Ms. Winkels. In this campaign the investigation of the wall paintings was intensified and a documentation method defined (see Final Report 2010).

In 2012 the measures applied before were evaluated. The conservation materials and methods for application proved to be appropriate and it was decided to continue in the same way.

From 2012 through 2018 four field schools with trainees from Egypt and Germany took place. Working side by side and hand in hand has proved to be a very successful model for exchange in many ways, professionally and interculturallly, and for making new friends.

4. Materials and Measures

After inspecting the tombs and assessing the treatments of previous campaigns the trainees were introduced to the conservation materials and methods. The measures of the campaigns of 2012, 2014 and 2015 have proved to be efficient and thus were continued.

The trainees tested the materials at the annex of the Gabra house. This exercise included structural stabilization of mud bricks and joint mortar, and the preservation of loose plaster fragments by grouting with a suitable conservation plaster, designed for the needs at this site.

All recipes were based on the Cellulose-Ethers Klucel E, M and Tylose MH 10.000 as reversible glues. For grouting an additional material was introduced, an aqueous silica acid dispersion, brand name Ludox PX 30.

We continued our work in areas where the walls are exposed to the elements, and human action GB24=M9/SE antechamber and room, GB16=M6/SS first room and GB27=M9 façade. Only tomb GB13=M5/SS can be locked and secured by a door. In these tomb houses, like in many others, the painted plaster is in many places detached from the brick walls and in danger of falling off.

Our foremost aim was to prevent further decay. It is for this reason that emergency conservation measures have been applied on all the worked walls. The measures were done in the following steps. After careful dry cleaning with soft brushes and air blowers, the bricks of the wall had to be consolidated where they were disintegrated, to provide a solid substructure for the treatments to come. The

paint-layers, wherever in need, were consolidated. After this, the loose parts of the plaster were stabilized by rendering edges with a conservation plaster. Some of the detached plasters required an additional treatment to secure them. The injections of a fluid and fine-grained mortar (grout) can fill voids between the plaster and the brick wall, and stabilize areas of instable detachment. There were used two different recipes of grout. One for small hollow spaces and one for bigger spaces.

A recipe and material list can be found in the Appendix. A thorough documentation of all emergency conservation measures in writing, by photographs and by mapping was done.

5. Work areas

5.1. GB27=M9c outside

At the eastern facade of GB27 some original plaster with fragments of paint is remaining. Mainly red paint, but also hues of green and some fragments of ochre can be seen in the small niche on the left side. The original plaster is in dire need of stabilization. A comparison of the mapping of 2014 showed, that new losses of plaster have occurred.

The measures of the field school 2015 were continued. As many areas of plaster were detached from the wall, it had to be stabilized by rendering edges and the grout injections. With the help of syringes the grout could be injected through existing holes in the gabs between the detached plasters. The emergency conservation measures in this area could be completed.



Figs.02,03,04:
Working areas of
GB27 outside,
after treatment



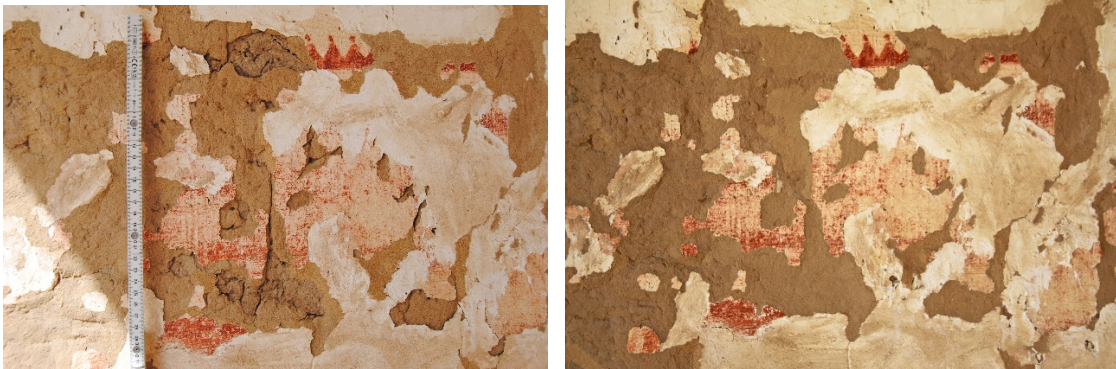
5.2. GB24=M9/SE antechamber

In GB 24 the wall paintings are executed on a fine lime layer (primer), applied on a thin mud plaster on a mud brick wall. The painting shows many little lost areas and the fine edges of the primer-layer are very fragile.

The measures of the field school 2015 were continued. Consolidation of the mud plaster was repeated, where it seemed necessary. Then the stabilization of endangered plaster edges with a conservation plaster was carried out. To consolidate areas with detached primer a very fine grout was injected underneath the thin layers. This tomb is freely accessible and therefore particularly endangered. It should be continually monitored.



Figs. 05,06: GB24, antechamber north and east walls, after conservation



Figs.07,08: GB24, antechamber east wall, before and after treatment

5.3. GB24=M9/SE inside

This beautifully decorated tomb house is unfortunately open to access, and much destruction by vandalism can be seen here. The emergency conservation of the wall paintings started this year.

After careful dry cleaning with soft brushes, the stabilization of endangered plaster edges with a conservation plaster was carried out. The measures of this year could achieve a more stable situation by closing holes and cracks and securing edges with conservation plaster. The work has to be continued.



Figs. 09,10: GB24 inside,north wall,
before and after application of conservation plaster



Fig.11: GB24 inside, south side after partial conservation



Fig.12: GB24 inside, northth side after partial conservation

5.4. GB16=M06/SS first room

The measures of the field school 2014 were continued. As many areas of plaster were detached from the wall, it had to be stabilized by rendering edges and grout injections. With the help of syringes the grout could be injected through existing holes in the gaps between the detached plasters and the brick wall.

The emergency conservation measures in this tomb could achieve a more stable situation. This tomb is freely accessible and therefore particularly endangered. It should be continually monitored.



Figs.13,14: GB 16 first room, south wall, before and after conservation



Figs.15,16: GB 16 first room, south wall, before and after grout injections; the Japanese paper facing could be removed after stabilization

5.5. GB13/M05/SS first room

In GB 13 the painted plaster is in many places detached from the mud brick walls and in danger of falling off. The measures of the field school 2015 were continued. The main task was to stabilize detached and instable parts of the plaster by grout injections, that filled and stabilized small cracks and big voids with two different recipes with grouts, designed for the needs at this site.

The emergency conservation measures of the wall paintings in the first room could be completed. This tomb is locked and secured by a door.



Figs.17,18: GB 13 first room, south-east wall, before and after grout injections; the Japanese paper facing could be removed after stabilization



Figs.19: GB 13 first room, east wall, after conservation

6. Documentation

All working areas were photographed digitally and precisely described in writing. In addition, mapping was done a) for the condition (visible deterioration) and b) for the conservation treatment. At first, a hand-mapping over photo prints was carried out on site. Later, the mapping will be digitalized with specialized computer programs.

7. Closing windows

In three places open windows were closed with mesh to prevent animals to enter.



Fig.20: GB 29 north side (Egyptian house), windows were closed with mesh



Figs.21, 22: GB 20 west side (Hermokrates) and GB 04 south side, windows were closed with mesh

2. The excavation

After more than 10 years of survey and restauration at Tuna el-Gebel we are very grateful that the Permanent Committee finally approved to our application of starting an excavation.

Members of the team were the following persons:

Prof. Dr. Katja Lembke	archaeologist, head of the mission
Hysam Adel Ezat Fahmi	inspector MoA
Rex Haberland	surveying engineer
Alexander Gottschald	surveyor
Helena Langheinrich	surveyor
Katharina Westphalen	architect



Fig. 23: The members of the team with the workers in the house and on the excavation site

We also thank our workers for their effort:

Shehata Abdelaziz, Taha Atiya, Salah Mohamed, Mahmoud Salhin, Ahmed Abdou, Shehata Mohamed, Mustafa Omar, Abdelaziz Hedeja and Basim Fathi.

As the first site we chose an area south of the tomb houses excavated by Sami Gabra, because during the geophysical survey we discovered an interesting structure that might be interpreted as a stone tomb.

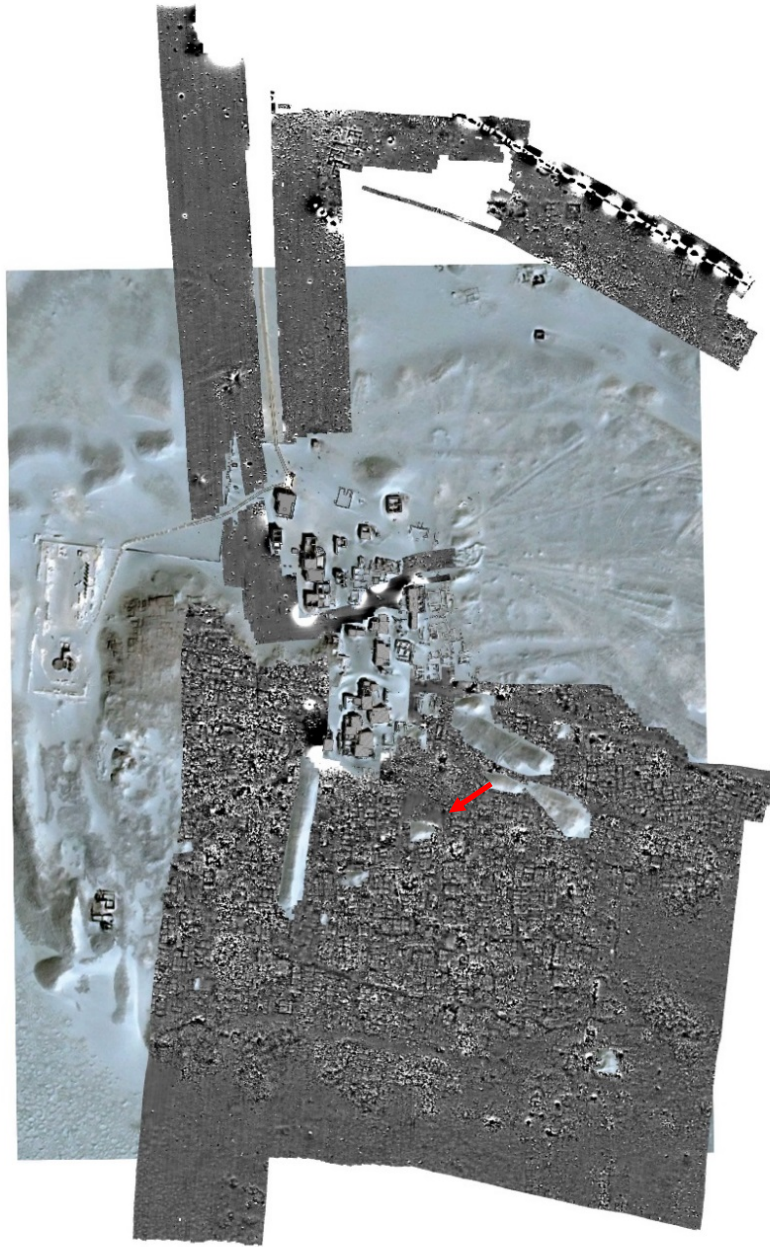


Fig. 24: The area of the excavation is marked in red

From March 11th to 22nd, 2018 we started the first excavation south of the area excavated by Sami Gabra. During this season we found at least two structures: At first we discovered a barrel vault orientated from north to south that was collapsed in its southern part. From this area we saved some sherds in order to document and classify them during the next season. Most of them belong to the so-called kitchen ware, i.e. were used for the storage of food and the preparation of meals. Further south the sand is clean.

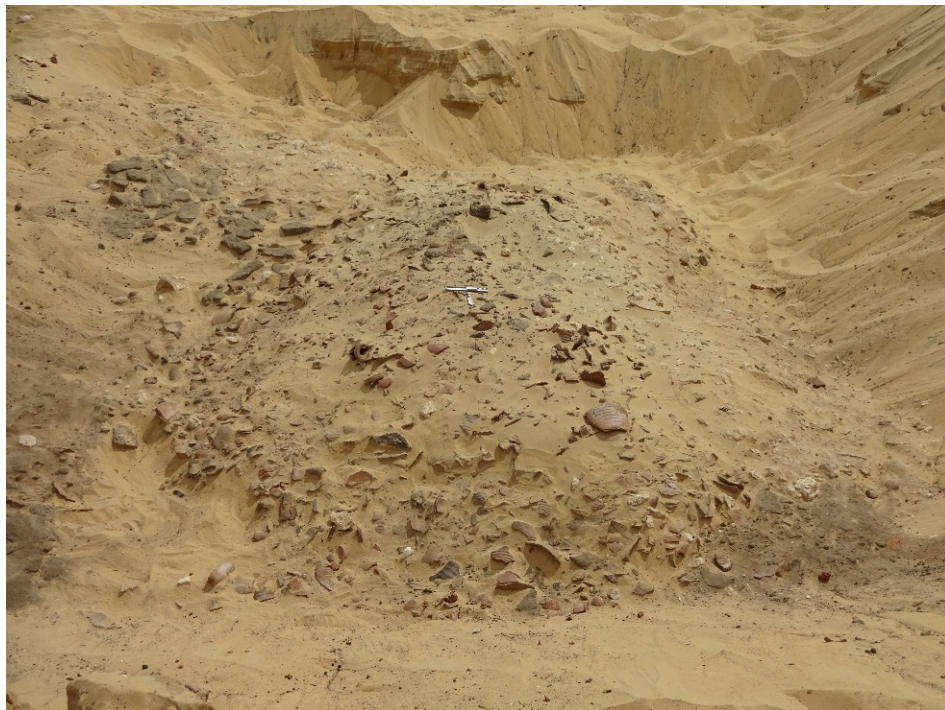


Fig. 25: The barrel vault from the north



Fig. 26: The southwestern corner of the roof showing a mixture of adobe bricks, sherds, and limestones used for building the vault



Fig. 27: Sherds found in the collapsed southern part of the barrel vault

According to the elevation of the barrel vault and the missing structures on top of it, the building certainly had a ground floor only. As in Tuna el-Gebel the barrel vaults are generally orientated across, the entrances were presumably in the western and/or eastern wall.

To the east the situation remains unclear. While at first we assumed a further vault in this area, the 3D-picture rather suggests another part of the barrel vault deformed by sand.

To the northwest we partly cleaned another vault from sand, while to the north we stopped working because of the big quantity of sand, which was not possible to be removed in such a short campaign.



Fig. 28: Southern part of the barrel roof in the front and the second vault in the background

The roofs consist of adobe bricks. The barrel vault has a high dome, and many sherds were caked with the mudbrick and may have served as “chinking sherds” to fill the gaps between the bricks of the vault for stabilization. Furthermore, many fragments from local stone are spread on the roof due to surface weathering of a neighbouring stone building. Probably also from there originate two blocks of local limestone found in the southwestern corner of the cleaned area. With a length of max. 60 cm they may have belonged to one of the earlier stone buildings (cf. GB 14: L 45-54 cm, H 23 cm or GB 15: L 44-53 cm, H 21 cm). As GB 14 and GB 15 were possibly built during the first century AD, the new building may be older, i.e. late Ptolemaic or early Roman period. The blocks are roughly chipped, as usually at Tuna el-Gebel during this period.

While the known tomb houses had an attica zone surrounding the vault of the ground floor to permit the insertion of a floor for the second storey without endangering the vault below, the barrel vault does not seem to have such a boundary. Furthermore, the dome is unusually high, but still comparable to the vault of GB 4. As far as we may state now, the building seems to be undisturbed and damaged by sand only.

It is our aim to clean the whole structure during the next season in October / November 2018.

Prof. Dr. Katja Lembke

Field director

Dr. Silvia Prell

Assistant field director



Second vault

Barrel vault

Blocks of local
limestone

470

L: 51 cm
B: 24 cm
H: 22 cm

L: 60 cm
B: 23 cm
H: 25 cm

90

KUPPELAUFSICHT

Maße ungebrannter
Lehmziegel
L: 20 cm
B: 9.5 cm
H: 7.5 cm




45

ANSICHT

KUPPELAUFSICHT UND ANSICHT

0 1 2.5 5 10m



-  Scherben in Lehm gebacken
-  Weißer Bruchstein im
Rosamörtel-Verbund
-  Ungebrannte Lehmziegel

Appendix: Conservation material recipes - Field school 2018, Tuna el Gebel

These recipes were used successfully in previous campaigns.

1. Structural consolidation

<u>Recipe/ Composition</u>	<u>Application</u>	<u>Mapping colour</u>
<u>1 a) First step- mud brick masonry:</u> 1% Klucel E → in Ethanol (89 %) and Demineralised water (10 %)	<ul style="list-style-type: none">- Dry cleaning of the area with soft brushes and air blower. Afterwards application of Klucel with syringes and Cannulaes: <ul style="list-style-type: none">- Application on whole bricks along the plaster edges, of bricks behind the plaster edges as far as reachable and of joint mortar.- Make sure that the surface is evenly soaked with the consolidant- Then leave to dry.	
<u>1b) Second step - mud brick masonry:</u> 20% Ludox PX 30 → in demineralised water (70%) with Ethanol (10%) (The aqueous silica acid dispersion Ludox PX 30 contains a 30 % concentration of silica and a specific weight of 1200 g/litre.)	Application with syringes and cannulaes (or if necessary with soft brushes)- after drying of Klucel E in first consolidation step (see 1a). <ul style="list-style-type: none">- Application on whole bricks along the plaster edges, of bricks behind the plaster edges as far as reachable and of joint mortar- Make sure that the surface is evenly soaked with the consolidant.- Then leave to dry.	

2. Rendering mortar for lime plaster edges and small fillings within white plaster

<u>Recipe/ Composition</u>	<u>Application</u>	<u>Mapping colour</u>
<p><u>2a) Rendering mortar</u></p> <p>Binder: 1 % Tylose 10.000 in demineralised Water</p> <p>Filler: Marble powder : Sand → 1 : 3 (volume parts)</p> <p>Sand: Desert sand from the necropolis, washed and dried</p> <p>Mixture Binder/ Filler: 1 : 5 (volume parts)</p>	<ul style="list-style-type: none"> - Dry cleaning of areas with soft brushes and air blower. <p>Application of mortar with spatulas on surfaces pre-consolidated with conservation material 1a or 1b (see section 1).</p> <ul style="list-style-type: none"> - Before the rendering mortar is applied it should be assured that the plaster edges are stable enough - The mortar must be thoroughly applied onto the plaster edges and the gaps behind - Make sure to always cover the mortar material you do not use immediately- to prevent it from drying out. 	
<p><u>2b) Second step- consolidation of rendering mortar (only in outside-areas)</u></p> <p>20% Ludox PX 30 → in demin. water (70%) with Ethanol (10%)</p>	<p>Application with syringes or paint brush - after drying of rendering mortar.</p> <ul style="list-style-type: none"> - Application of whole bricks along the plaster edges, of bricks behind the plaster edges as far as reachable and of joint mortar - Make sure that the surface is evenly soaked with the consolidant - Then leave to dry - Very clean working is necessary- the Ludox PX 30 cannot be removed after drying! 	

3. Mortars for the conservation of clay plaster

<u>Recipe/ Composition</u>	<u>Application</u>	<u>Mapping colour</u>
<p><u>3a) First step- Rendering mortar</u></p> <p>Binder: 1 % Tylose 10.000 in demineralised Water</p> <p>Filler: Clay + washed desert sand → 1: 10 up to 1:8 (volume parts)</p> <ul style="list-style-type: none"> - The mixture of the filler should be chosen after the mortar colour of the original plaster. The higher the clay content/ less sand- the mortar colour gets more brownish and slightly darker. <p>Mixture- Binder/ Filler: 1 : 4,5 (volume parts)</p>	<ul style="list-style-type: none"> - Dry cleaning of areas with soft brushes and air blower. <p>Application of mortar with spatulas on surfaces pre-consolidated with conservation material 1a or 1b (see section 1).</p> <ul style="list-style-type: none"> - Before the rendering mortar is applied it should be assured that the plaster edges are stable enough - The mortar should be applied to the niveau/ surface level of the thin original white plaster layer to secure the fragile plaster edges too. - Make sure to always cover the mortar material you do not use immediately- to prevent it from drying out. 	
<p><u>3b) Second step- consolidation of rendering mortar (only in outside-areas)</u></p> <p>20% Ludox PX 30 → in demin. water (80%) with Ethanol (10%)</p>	<p>Application with syringes or paint brushes - after drying of rendering mortar.</p> <ul style="list-style-type: none"> - Make sure that the surface is evenly soaked with the consolidant. - Then leave to dry 	

4. Injection grouts

<u>Recipe/ Composition</u>	<u>Application</u>	<u>Mapping colour</u>
<p><u>Grout for the injection of voids between plaster and mud brick masonry- thin voids</u></p> <p>Binder: 1 % Tylose 10.000 in demin. water + Ludox PX 30 (pure) (Mixture: 1:1 in volume parts)</p> <p>Filler: Marble powder : micro glass bubbles → 1: 1 (in volume parts)</p> <p>Mixture Binder/ Filler: 1 : 2 (volume parts): 1 volume part: Binder 1 volume part: Marble powder, 1 volume part: Micro glass bubbles</p>	<ul style="list-style-type: none"> - Dry cleaning of area with air blower <p>Application with syringes, First pre- consolidation and slight wetting with 1% Klucel E in Ethanol (89%) with demineralised water (10%) (see section 1).</p> <ul style="list-style-type: none"> - Leave to dry - Then injection of fine grout - Very clean working is necessary- the Ludox PX 30 cannot be removed after drying. 	
<p><u>Grout for the injection of big voids between plaster and masonry – big voids</u></p> <p>Binder: 1 % Tylose 10.000 in demin. water + Ludox PX 30 (pure) (Mixture: 1:1 in volume parts)</p> <p>Filler: 1,5 volume part: Marble powder, 1,5 volume part: Micro glass bubbles 1,5 volume part: Poraver 0,04-0,125 1,5 volume part: Poraver 0,25-0,5 0,25 volume part: Aerosil 0,1-0,3</p> <p>Mixture Binder/ Filler: 1 : 2 (volume parts): 1 volume part: Binder</p>		

5. Japanese paper facings

<u>Recipe/ Composition</u>	<u>Application</u>	<u>Mapping colour</u>
<p>1,5% Klucel M in Isopropanol (88,5 %) with content of demineralised water (10%)</p>	<ul style="list-style-type: none"> - Dry cleaning of area with soft brushes and air blower. <p>Application on fragile paint layer and plaster sections to prevent further loss.</p> <ul style="list-style-type: none"> - The consolidant is applied on the backside of the cut out Japanese paper piece. - Then the paper can be applied on the fragile surface with a soft brush. 	

6. Structural consolidation of paint layer

Recipe/ Composition	Application	<u>Mapping colour</u>
7 a) 1 % Klucel E → in Isopropanol (89 %) with demin. water (10%)	<p>- Dry cleaning of area with soft brushes and air blower</p> <p>Application with syringes or for bigger areas by spraying with a spraying device called “Funpump” that produces a fine mist.</p> <p>This method enables the application without touching the original surface.</p> <p>Where the paint layer is powdering the consolidant should only be sprayed on the surface- even fine brushes should not be used as the paint layer there is too fragile to prevent pigment reduction with the brush.</p> <p>- Very fine, soft brushes can be used for application in more stable areas; here a Japanese paper can be used as a protection layer between brush and wall painting surface.</p>	
7 b) 2 % Klucel E → in Isopropanol (88 %) with demin. water (10%)	<p>If more consolidant is needed to reach the necessary consolidation this Klucel E percentage can be used for the paint layer conservation.</p> <p>The application applies to the description in 7a.</p>	

7. Grout for the injection of whitewash/ paint layer scales

Recipe/ Composition	Application	<u>Mapping colour</u>
<p><u>8 a) Fine injection grout with filler</u></p> <p>Binder: 2 % Klucel E → in Isopropanol (88 %) with demin. water (10%)</p> <p>Filler: Marble powder + micro glass bubbles → 1: 1 (measured in volume parts)</p> <p>Mixture Binder/ Filler: 1 : 2 (volume parts) + Brownish pigment</p>	<p>- Dry cleaning of area with soft brushes and air blower</p> <p>Application with syringes:</p> <ul style="list-style-type: none"> - First pre- consolidation and slight wetting with 1% Klucel E in Isopropanol - Leave to dry - Add only very small amount of pigment to the injection grout to break the whiteness and match the colour of the plaster; suitable pigments for Tuna el Gebel i.e.: Brown ochre, terra di sienna, burnt umbra “cyprisch” - Then injection of the fine grout - Leave to dry 	