

# Plaster, cartonnage, and the making of Egyptian coffins: project overview

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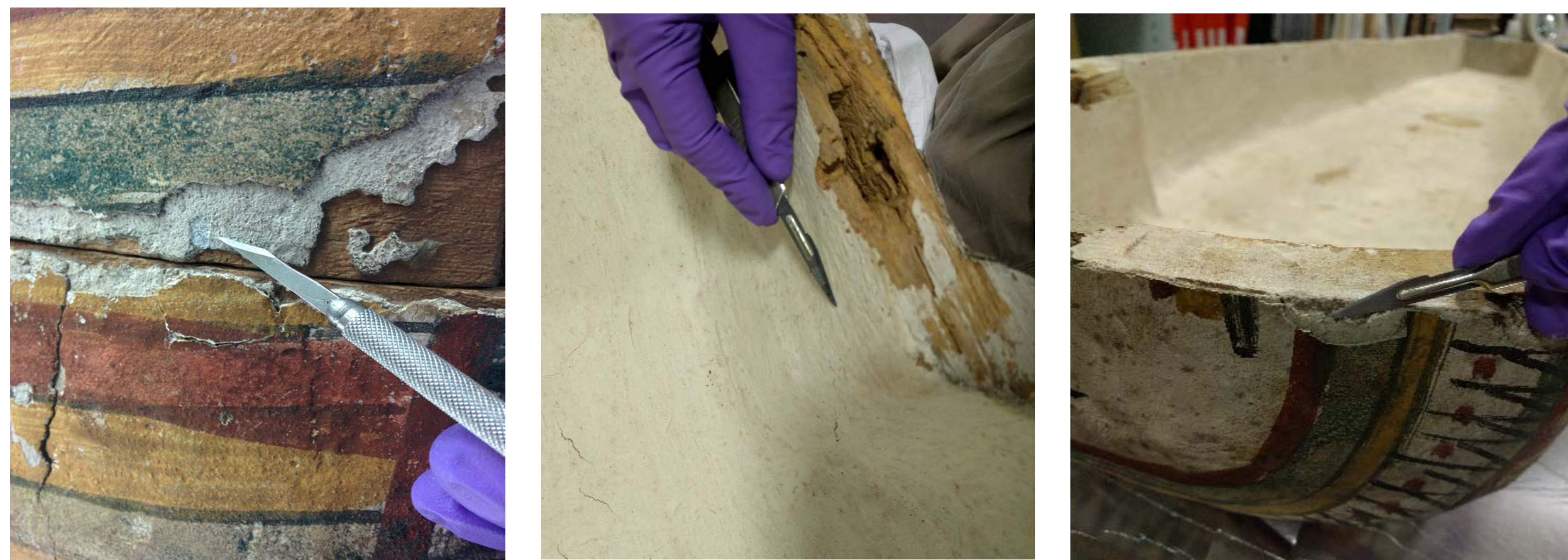
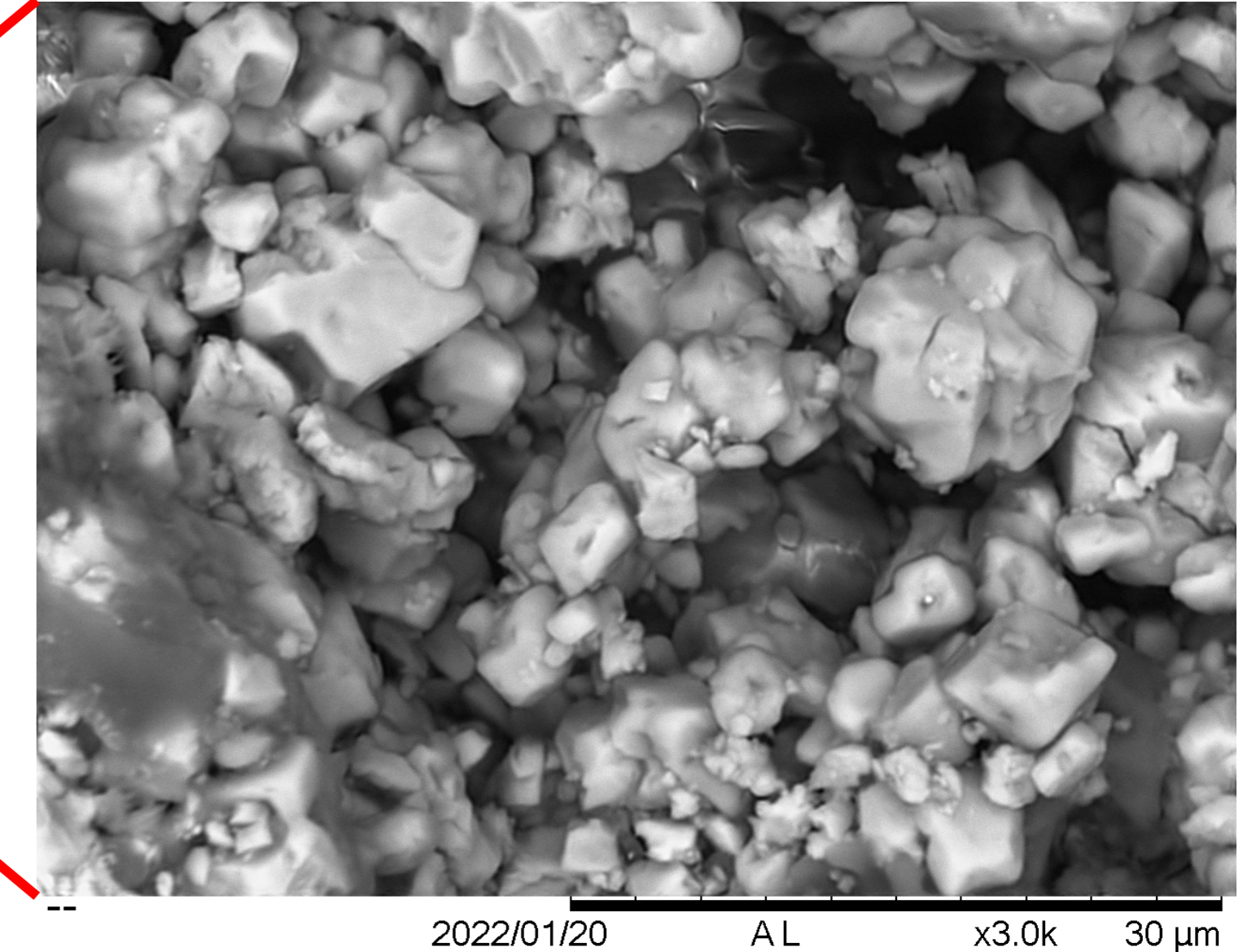
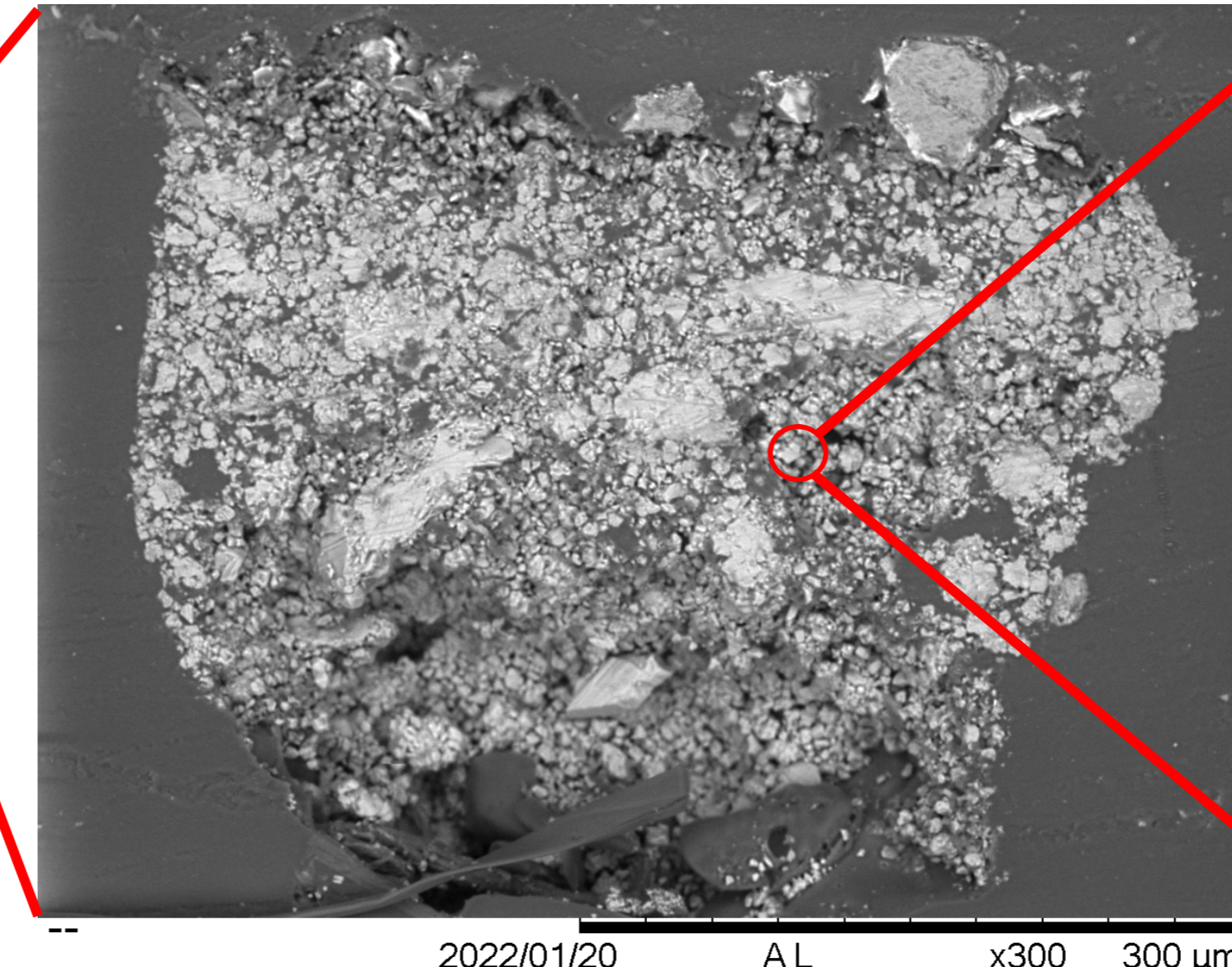
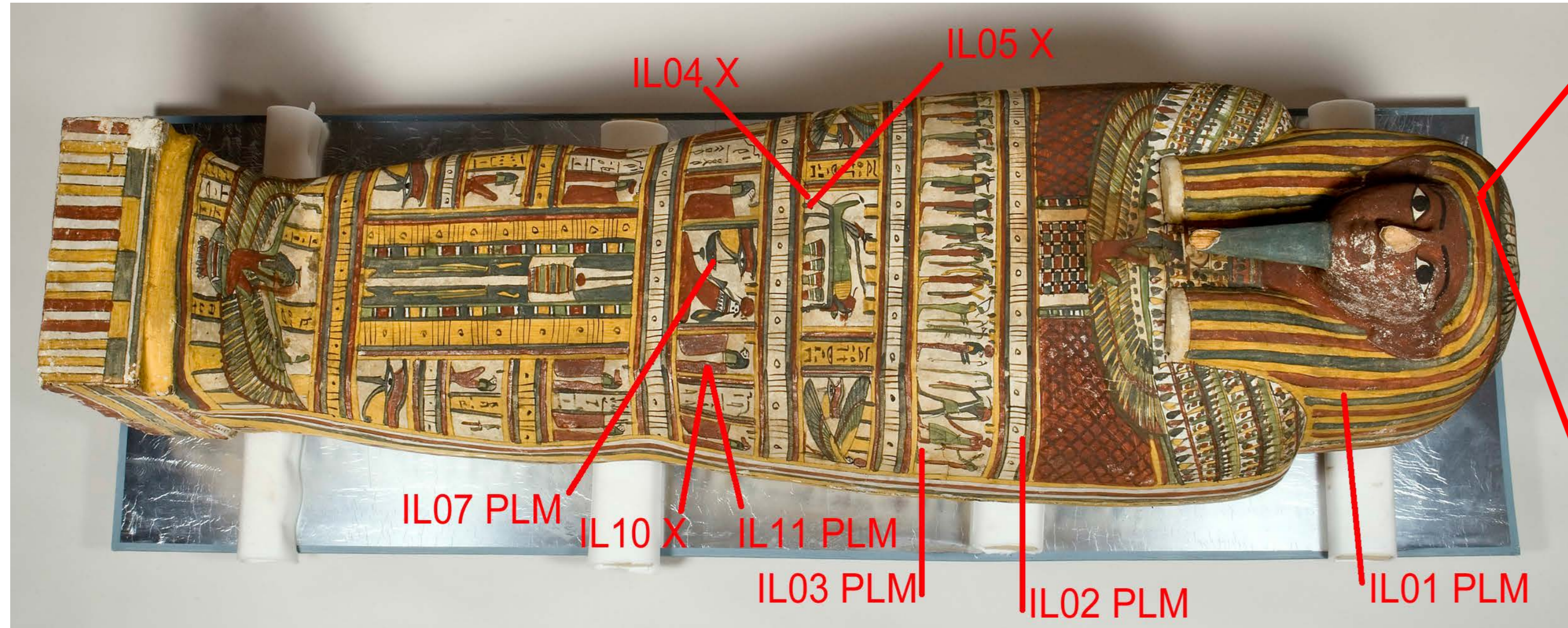
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PlaCe-ITN  
Pre-modern Plasters and Ceramics



On the left, inner coffin lid from the *Papepu's* coffin set (Fitzwilliam Museum Egyptian Collection) from the 25<sup>th</sup>-26<sup>th</sup> Dynasty and different sampling sites.

SEM-EDS analysis on one sample from the set were performed. This was a blue figure over black line and upper white paste layer. We can observe several components as:

- Ca from the calcite ( $\text{CaCO}_3$ )
- Si from the presence of quartz ( $\text{SiO}_2$ )
- Mg in very small amount. From impurities present in the original limestone
- Cu on the top, in the area in which the blue painting is presence (Egyptian blue -  $\text{CaCuSi}_4\text{O}_{10}$ )

In the biggest magnification, the characteristic shape of the calcite crystal is visible.

## Aims of the project

- More precise characterization of the variety of *plaster* and *cartonnage* materials used on Egyptian coffins as manufacturing components and preparation layers for decoration
- Examination of physical and chemical composition of these different artefacts, manufacturing method, origin of ingredient materials where possible
- Creation of an *analytical protocol and clear terminology* to differentiate all the materials
- **Timeline** from Old Kingdom to Greco-Roman one, considering:
  - Variability in Time, Space, Context/Status
  - Different workshops
  - Regional variability
- **Modus operandi** of plaster production (similarity and differences)

## What is “plaster”?

- Most abundant materials in the archaeological record.
- From *lime, gypsum or mud* used in building construction and object manufacture
- Currently an umbrella term in Egyptological literature for materials made from different types of chemistry from calcined lime and gypsum to pastes of ground rock mixed with organic binders
- External and sacrificial layer in architecture field
- **Preparatory layer** for pigment application

## What is “cartonnage”?

- Layers of linen, soaked in glue or gum, interspersed with gesso
- In use from Old Kingdom onwards
- Thick layer of white plaster on the surface
- Used to make moulded, free-standing coffins and coffin parts
- Found cartonnage-like material overlying a wooden coffin

## Methodology

- Prioritizing non-destructive techniques, to be able to preserve the sample for future analysis and studies
- Analysis of both inorganic and organic components (such as glues, fibers embedded in the pastes)
- Innovative synergetic interaction of the two areas

TECHNIQUE	EXPECTED RESULTS
OM	<ul style="list-style-type: none"> <li>• Preliminary analysis</li> <li>• Morphology</li> <li>• Main elements</li> </ul>
PLM	<ul style="list-style-type: none"> <li>• Main mineral components</li> <li>• Analysis of aggregates</li> <li>• Origin of material</li> </ul>
SEM-EDS	<ul style="list-style-type: none"> <li>• Elemental analysis</li> <li>• Map (distribution of elements)</li> <li>• Analysis of aggregates</li> <li>• Analysis of lumps and raw materials</li> <li>• Difference between gypsum and calcite</li> </ul>
XRF	<ul style="list-style-type: none"> <li>• Analysis of preparation layer</li> <li>• Qualitative analysis (results should be coherent with SEM and XRD)</li> <li>• Mapping of the surface</li> </ul>
Raman Spectroscopy	<ul style="list-style-type: none"> <li>• Analysis of pigments and preparation layer</li> <li>• Differentiation between calcite, gypsum and huntite</li> </ul>
μCT	<ul style="list-style-type: none"> <li>• Analysis of internal structure</li> <li>• Analysis of different layers, deteriorated areas, presence or absence of previous interventions</li> </ul>
XRD	<ul style="list-style-type: none"> <li>• Mineralogical composition and crystalline structure</li> <li>• Difference between gypsum and calcite</li> <li>• Analysis of aggregates</li> <li>• Origin of material</li> </ul>
FTIR	<ul style="list-style-type: none"> <li>• Analysis of functional groups</li> <li>• Employed for inorganic and organic components</li> </ul>
Paleoproteomics	<ul style="list-style-type: none"> <li>• Proteinaceous materials embedded in plaster</li> </ul>