AUSTRIA-INDONESIA: Cultural Heritage Conservation

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The Gunungan As 538: analytical characterisation, restoration and safe storage of a Javanese Wayang Kulit puppet

Authors

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The *Gunungan* : the front and the back

The object

Puppet *Gunungan*, named also *Kayon*

Inventory number

AS 538

Author

Unknown (Indonesian/Javanese manufacture)

Dating

19th- 20thcentury approximately

Material and technique

Skin-made artefact, perforated and painted on both sides, approximately 2 mm thick. A forked central wooden and bamboo stick, named *gapit*, works both as a stand and as a handle tied to skin by cotton fiber

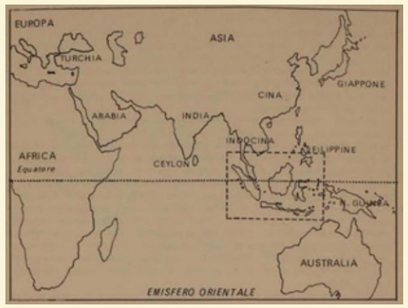
Measures

81.3 x 34.5 cm including the stick, 60.7 x 34.5 cm only the skin.

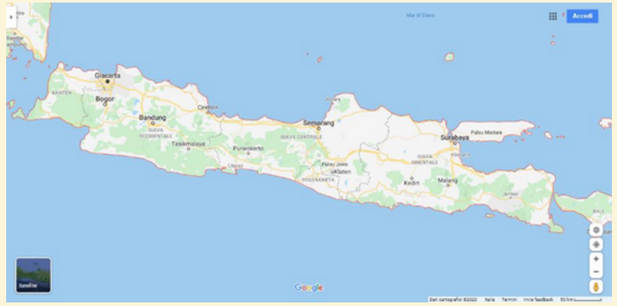
Ownership and place of conservation

Museum of Anthropology and Ethnography of the University of Turin (MAET)

Arrival of the work at the Museum of Anthropology and Ethnography in Turin (Italy)



Eastern hemisphere



The island of Java (Indonesia)

Authors Luca Invernizzi and Alberto Cassio (photographers and journalists)

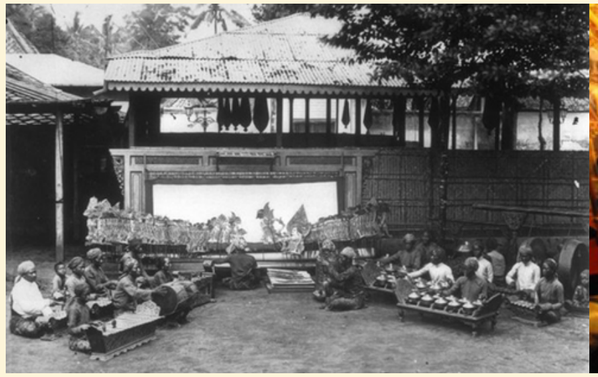
First photograph of the *Gunungan* at the Museum

The Indonesian works were kept in a nineteenth-century cabinet*

*they have currently been placed in modern museum cabinets and chests of drawers

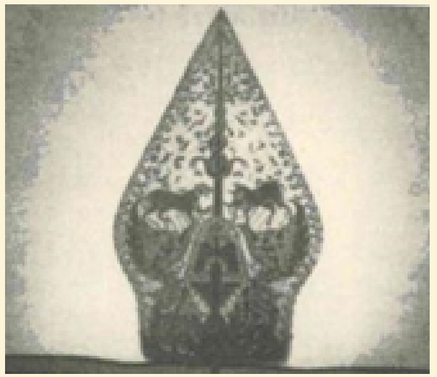
(*wayang* = theatre, *kulit* = skin) shadow theatre

Wayang Kulit*: scenic use of the *Gunungan

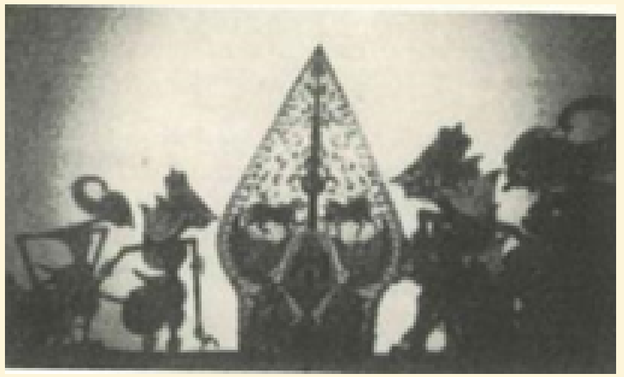


Performance by Wayang Kulit, late 19th- early 20thcentury

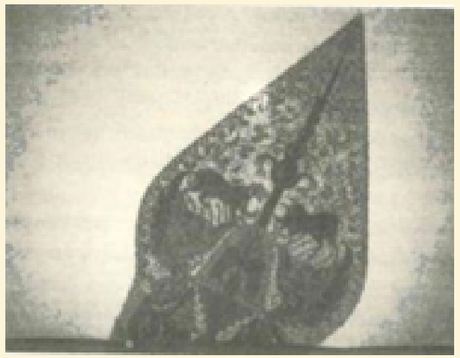
Wayang Kulit performance today



At the center of the screen
=
start of performance

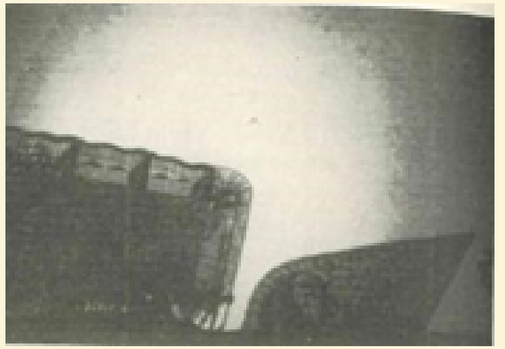


Straight to the center of the screen with the characters
=
end of performance



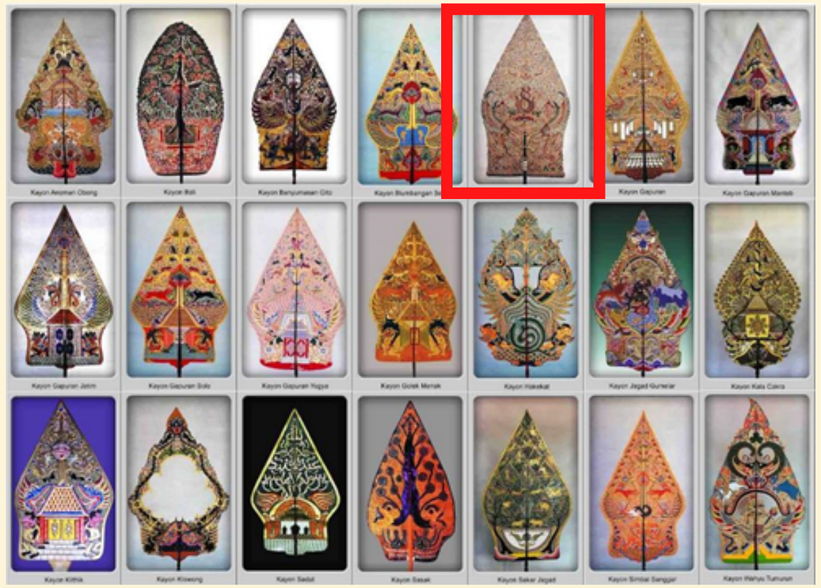
Slanted to the left or right
=
end of an important scene

Gunungan to symbolize the forest



Gunungan to symbolize the felling of the forest

The different types of *Gunungan* or *Kayon*



The 21 most used types of kayon.
the Kayon Cirebon is highlighted in red

An example from *Kayon Cirebon*

Our *Gunungan*

The figurative-symbolic elements that characterize the *Kayon Cirebon*

The divinity
Kālá or *Kaal*

A branch of the *Pohon*
(tree of life)

Kendaga
(box decorated with shells

The divinity
Ganesh

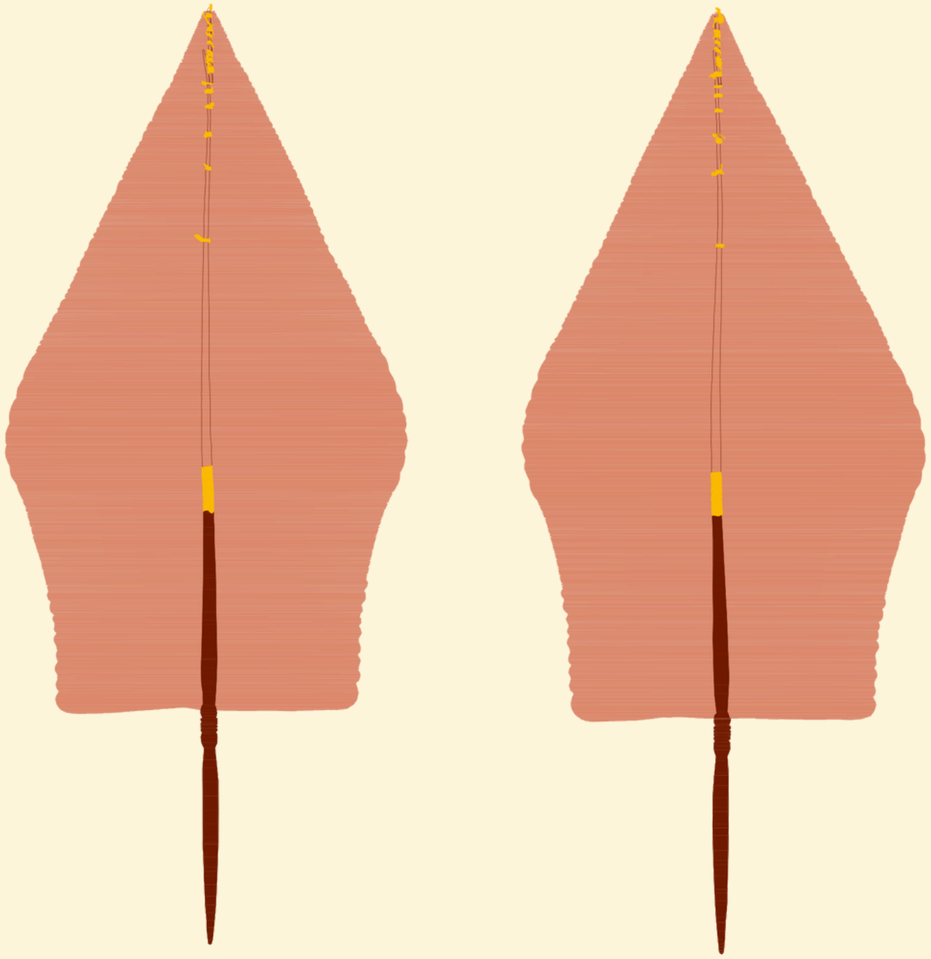
Burung
(bird)

Ular
(snake)

Bunga
(flower)

Defined animalistic figure
as "guardian"

MATERIALS AND METHODS



Front

Back

Parchment perforated and painted on both sides

Support structure-handle in carved wood

Support structure-handle in carved bamboo

Mercerized cotton binding yarns

PAINTED PARCHMENT

*Parchment of the *Gunungan*

Calf parchment just produced

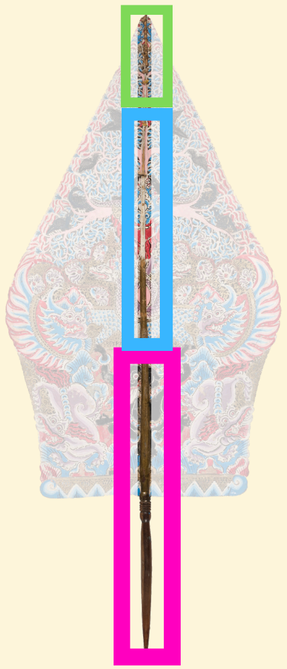
Follicular pattern of the calf

The letters and numbers highlight the perforated skin

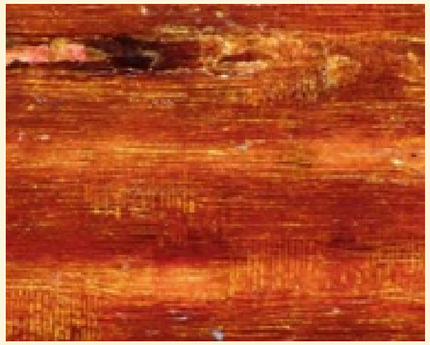
Detail of the back with shades of blue and purple

*Photography taken with
PORTABLE DIGITAL VIDEO MICROSCOPE

THE SUPPORT STRUCTURE: THE *GAPIT*

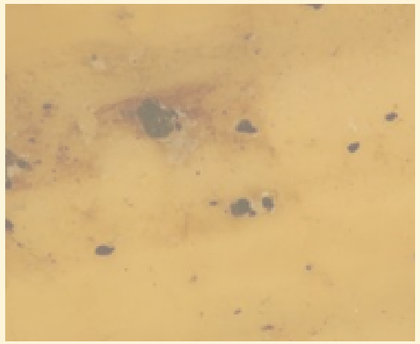


Wooden species
(unidentified)



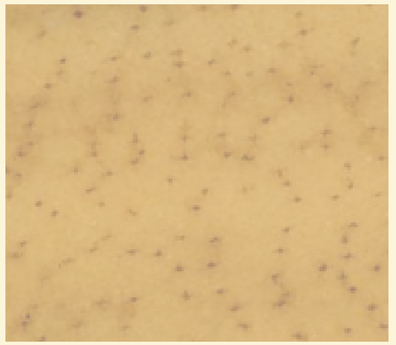
Radial section a 1.4 x

Bamboo
(long fraction)



1.4 x

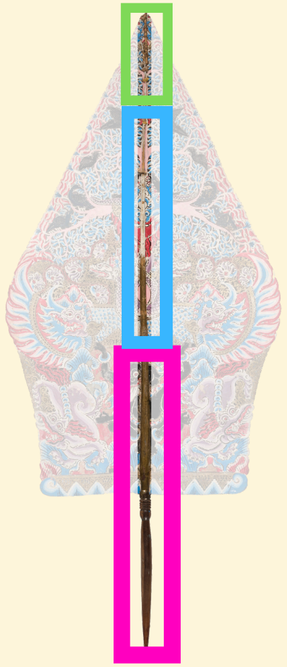
Bamboo
(short fraction)



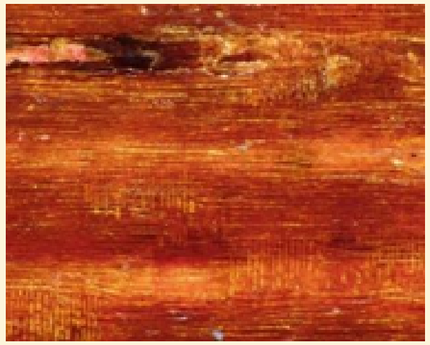
2.1 x

*Photography taken with
PORTABLE DIGITAL VIDEO MICROSCOPE

THE SUPPORT STRUCTURE: THE *GAPIT*



Wooden species
(unidentified)



Radial section a 1.4 x

Bamboo
(long fraction)

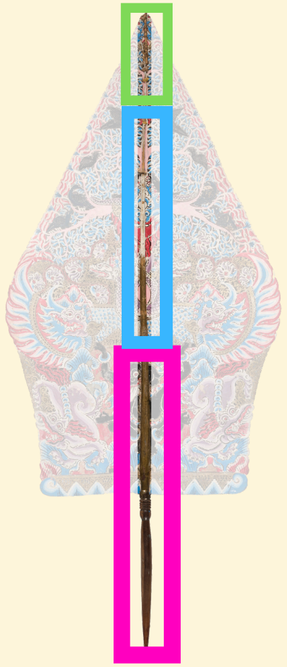
1.4 x

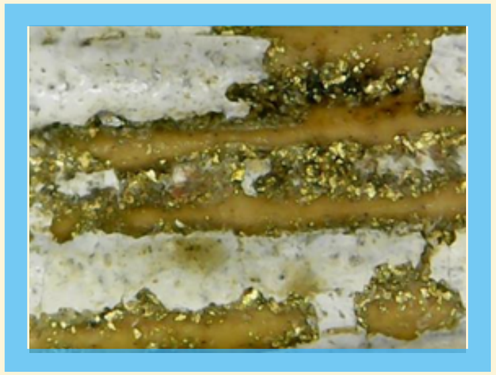
Bamboo
(short fraction)

2.1 x

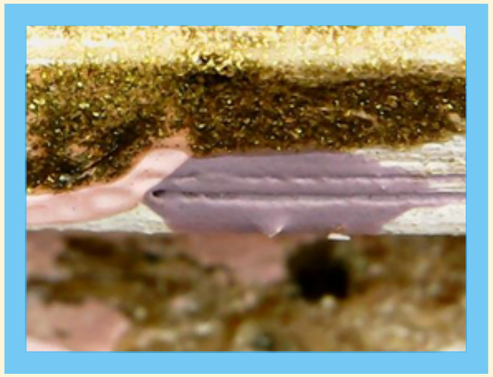
*Photography taken with
PORTABLE DIGITAL VIDEO MICROSCOPE

THE SUPPORT STRUCTURE: THE *GAPIT*





Underneath the white draft there's a glitter' layer



White layer and subsequent ones purple and pink spots below the glitter

Bamboo (short fraction) devoid of pictorial layers

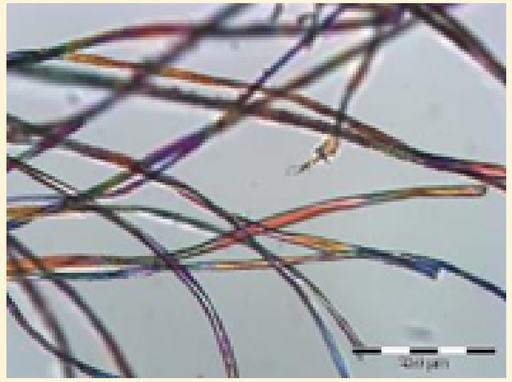
Translucent layer on the wooden handle

Glitter layer on the wooden portion

*Photography taken with PORTABLE DIGITAL VIDEO MICROSCOPE

BINDING SYSTEM

Mercerized cotton with different count and colour:
It has the task of joining the *gapit* to the skin



*Mercerized cotton at 20 x

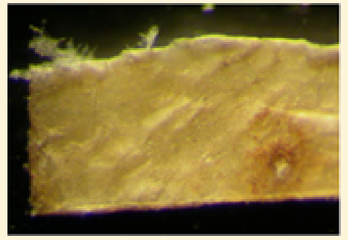
*Mercerized cotton at 50 x

*Photography taken with
OPTICAL MICROSCOPE

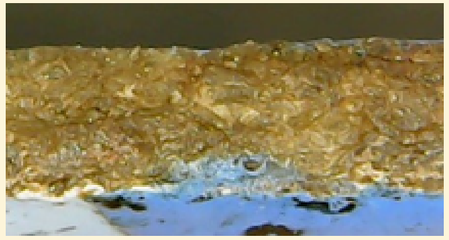
PAINTED PARCHMENT

Deformations of the front and back

Example of healthy parchment



Example of a parchment opaque and glass-like



*Vitrified parchment of the *Gunungan*

Example of vitreous layer

**14x photograph of one stratigraphic section of the parchment of *Gunungan*

*Photography taken with PORTABLE DIGITAL VIDEO MICROSCOPE
**Photography taken with 3D DIGITAL MICROSCOPE (Olympus DSX 1000)

PAINTED PARCHMENT

Measurement of the shrinkage temperature

The *gunungan* parchment is extremely sensitive to the input of heat and humidity already around 23 °C.

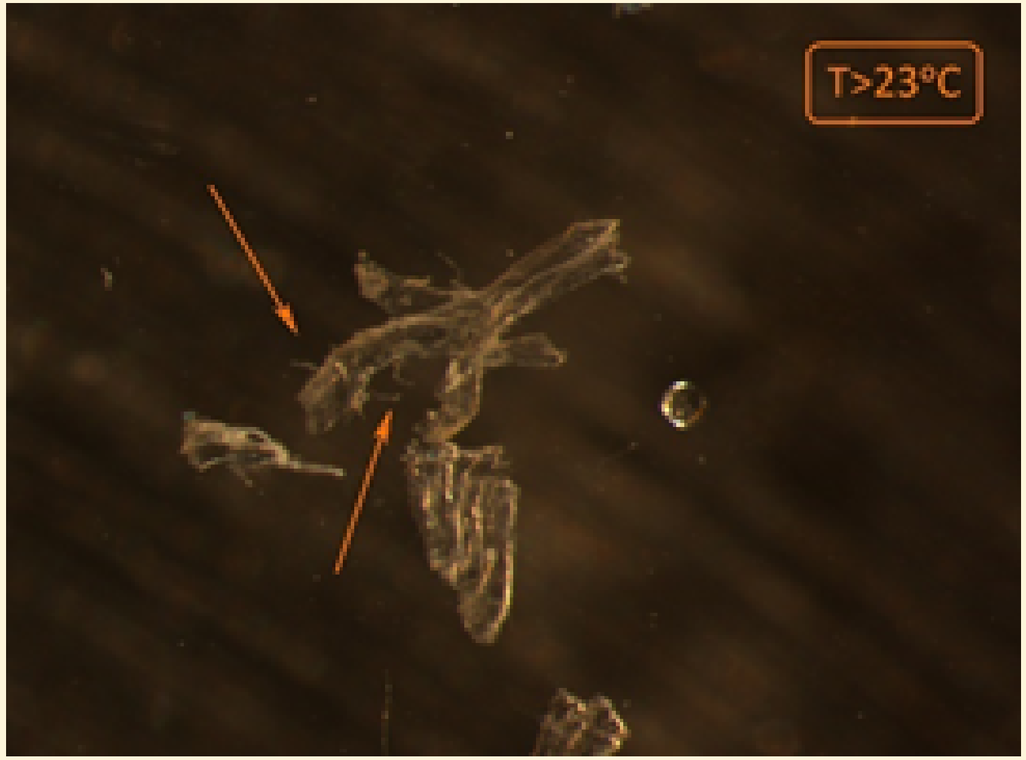
Healthy parchment: **Ts > 50** °C

Damaged parchment: **Ts < 35** °C

Gunungan's parchment: **Ts ~ 23** °C

pH measurement with agarose and pH meter

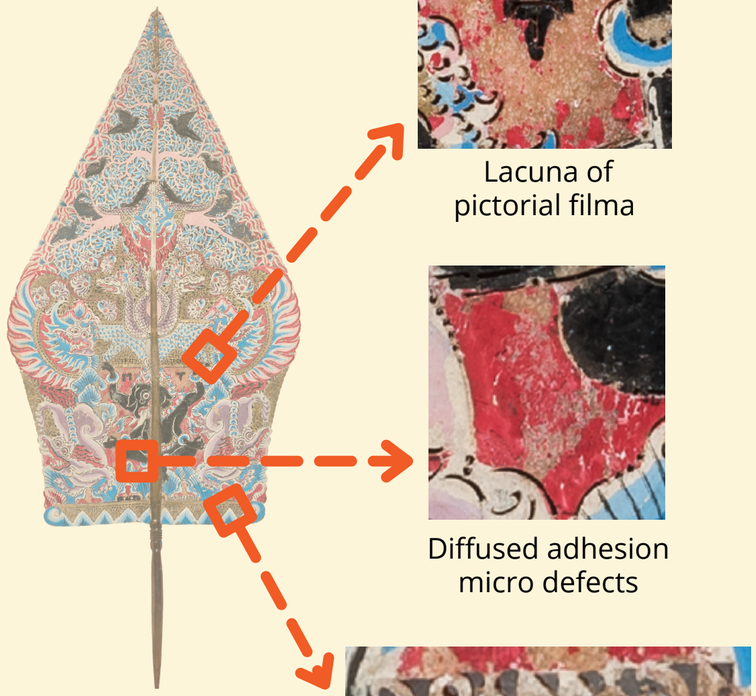
pH of ***Gunungan*: ~ 6.2 pH**



Otpical microscope image
of micrometric fibers of parchment shrinkage

PAINTED PARCHMENT

First pictorial phase



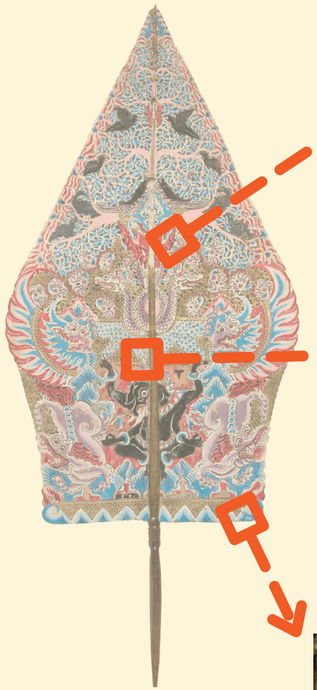
*Front

Lacuna of
pictorial filma

Diffused adhesion
micro defects

Layer gap
pigmented

Second pictorial phase



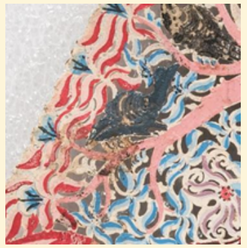
*Front

Layer gap
pigmented

Lacuna of
pictorial film

Lacuna and defect
of flake/bubble adhesion

Stain due to
presence of a resin
natural terpene



Due dark spots
due to cohesive dirt

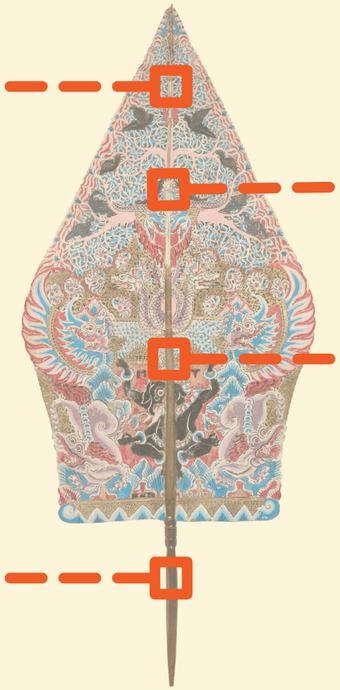
Cracks

*Back

*Everything is repeated on both the front and the back

THE *GAPIT*: support and pictorial phases

Break



*Front

Lacuna of
pictorial film

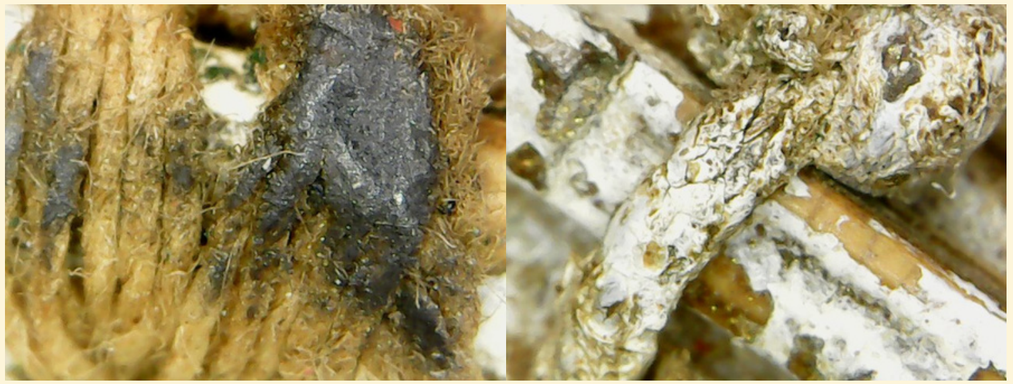
Scratches and nicks

Continuity solution
with tying yarn
which combines bamboo with wood

*Everything is repeated on the back

BINDING SYSTEM

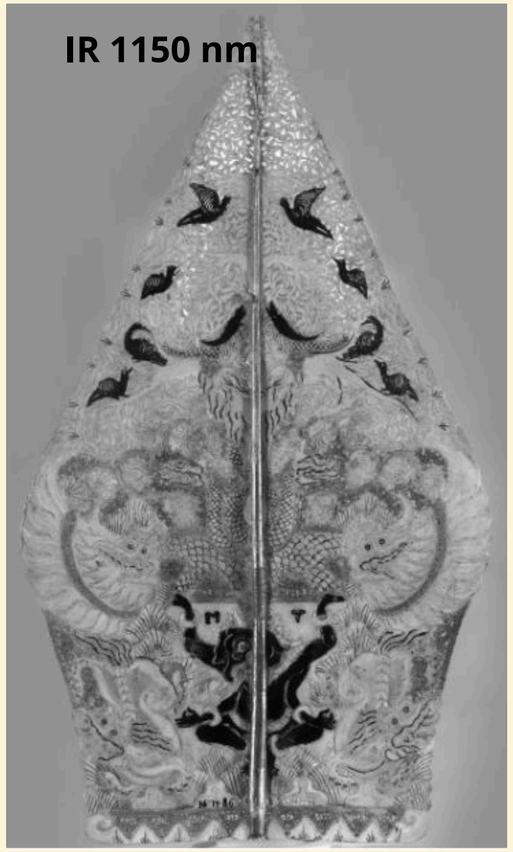
Binding over *Ganesh*: acts as a union between the wood of the grip part of the gapit and the bamboo



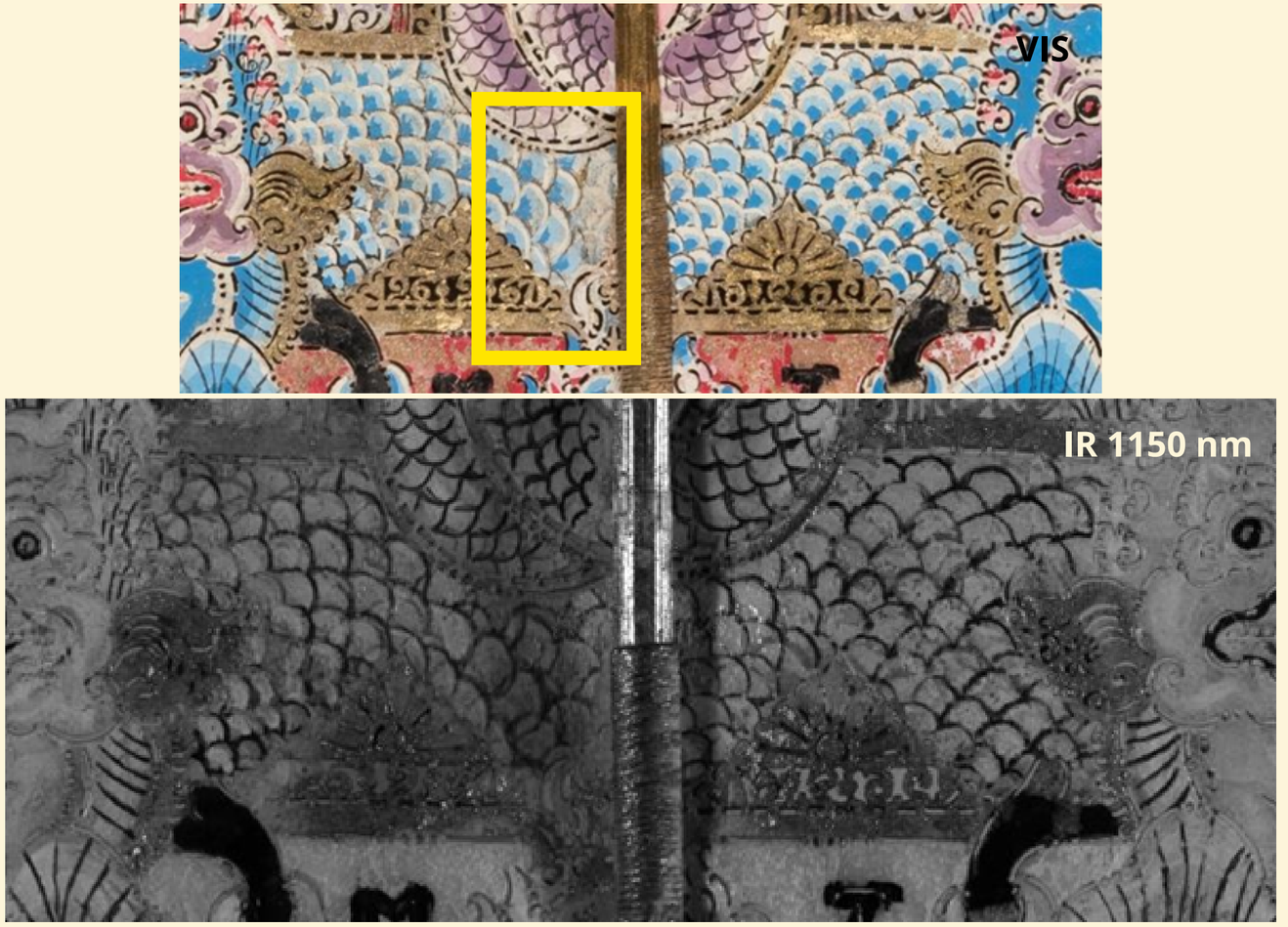
*Abrasion, loosing and cohesive dirt

*Photography taken with
PORTABLE DIGITAL VIDEO MICROSCOPE

IMAGING

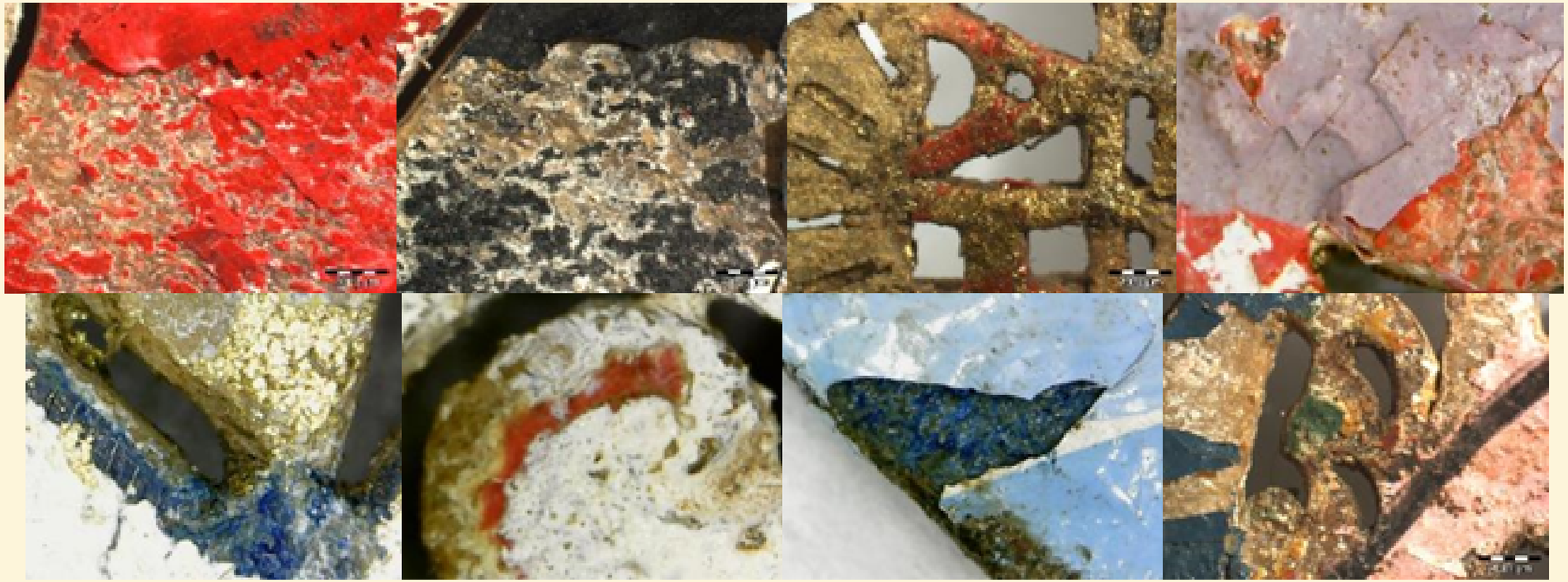


IMAGING



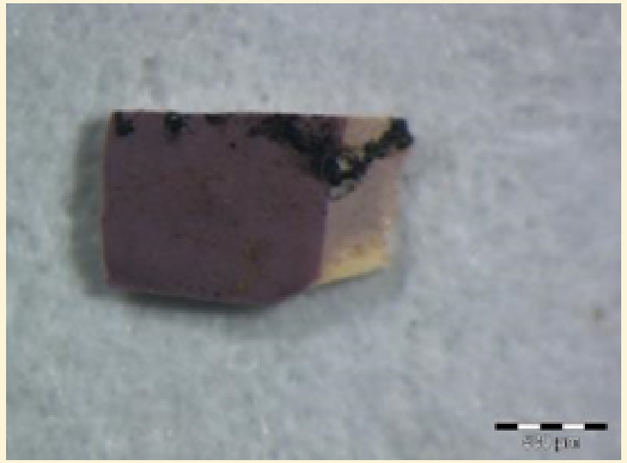
The yellow rectangle highlights the area that doesn't correspond between the visible light photographic shot and the infrared reflectography one

PHOTOGRAPHIC DOCUMENTATION via PORTABLE DIGITAL VIDEO MICROSCOPE

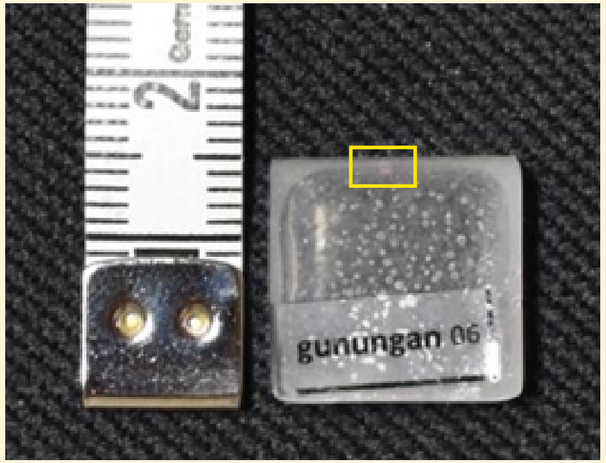


The shots show the actual presence of multiple layers of color:
you can see different colors underneath the colors visible today on the work

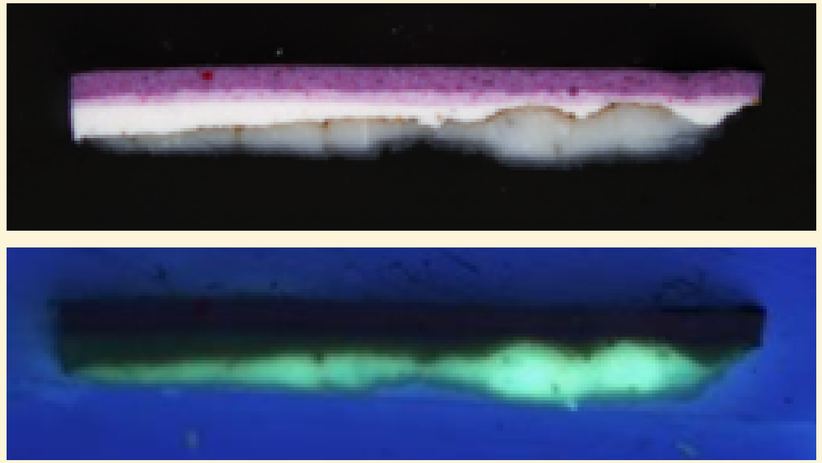
PREPARATION of the **STRATIGRAPHIC SECTION** and **OPTICAL MICROSCOPY** in **VIS** and **UV**



Erratic fragment photographed at stereomicroscope

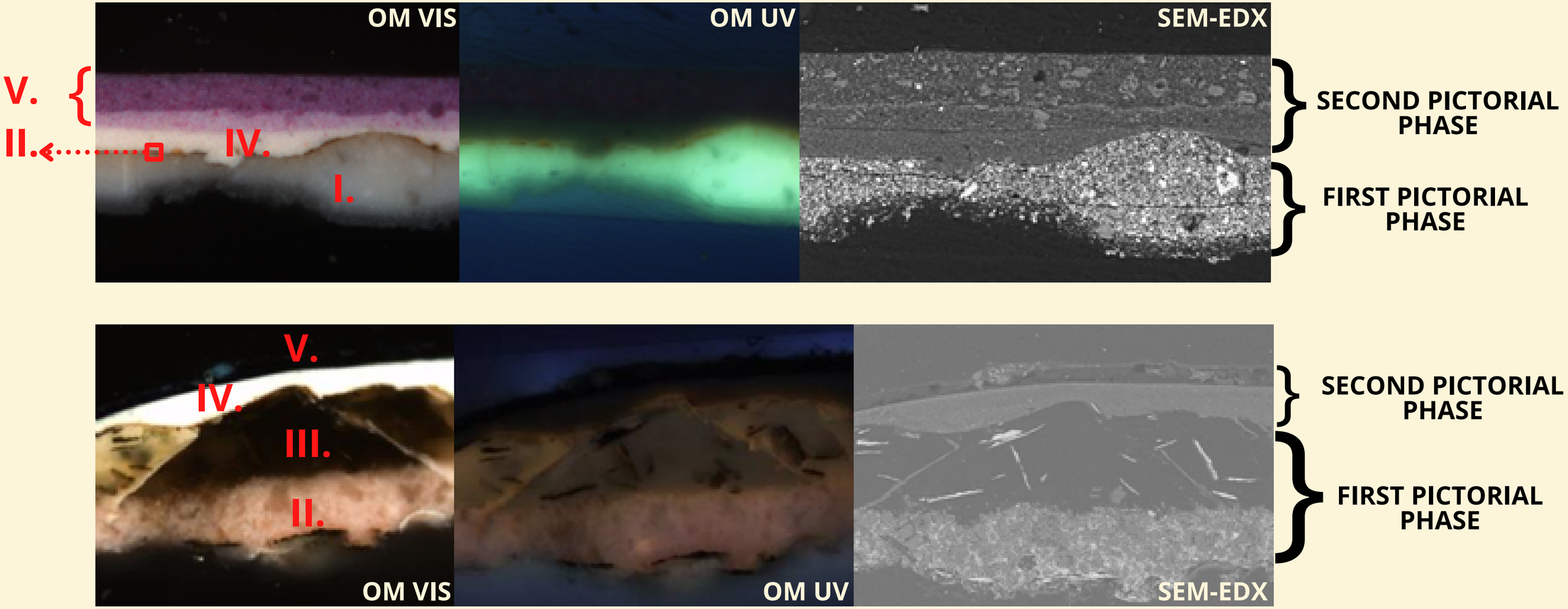


The yellow rectangle shows the incorporated erratic fragment in resin to observe the section



Erratic fragment observed by OM under visible and uv light

OPTICAL MICROSCOPY AND **ELECTRON MICROSCOPY** with scanning probe **(SEM-EDX)**



Two examples of analyzed stratigraphies

RESULTS and DISCUSSION

Complex stratigraphy

↓

TWO PICTORIAL PHASES

- 0. Parchment

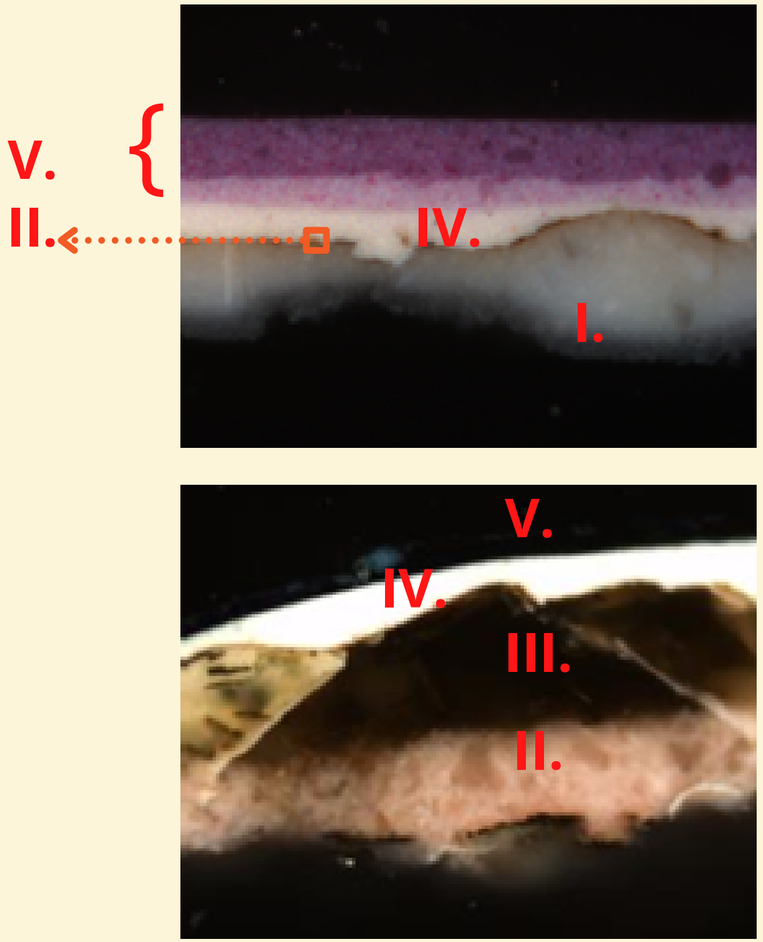
FIRST PICTORIAL PHASE

- I. White preparation layer composed of lithopone
- II. **Traces of original color**
- III. Organic layer with copper foils

SECOND PICTORIAL PHASE

- IV. Titanium white layer (alkyd)
- V. **Alkyd paint** for light blues, blues, blacks, purples and pinks; *pigment red 49* bound with natural resin for reds; glitter bound with natural resin.

*Photography taken with OPTICAL MICROSCOPE



*Two examples of analyzed stratigraphies

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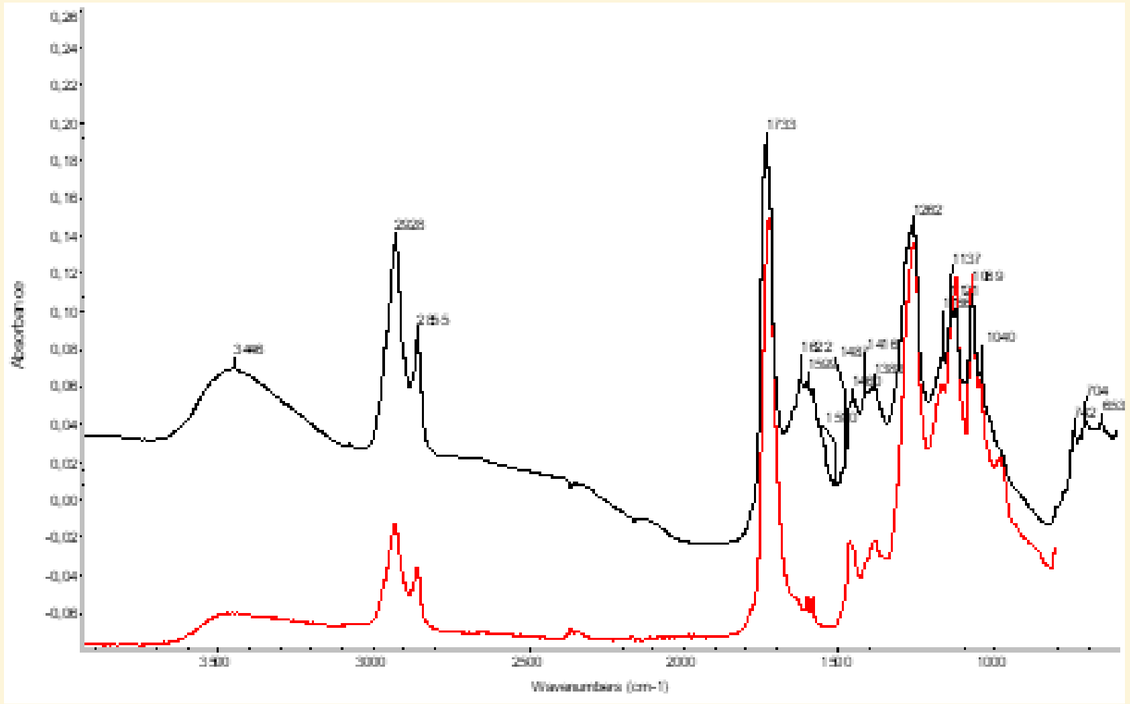
Fourier-transform infrared spectroscopy (FTIR)



FT-IR spectra of the sample (black line) and alkyd resin reference (red line)

RESULTS and DISCUSSION: PAINTED PARCHMENT

Optical analysis, photographic documentation, multispectral analysis
and **microscopic analysis (OM and SEM)** of erratic fragments and micro-samples in section.

↓

Multiple layers of color
between the support and the current paint film, where the **presence of paint** can also be seen **between one application and another**.

↓

In-depth study on the execution technique of the shapes:
comparative analysis between the bibliographic sources and the technique used on the *Gunungan*
Tradition requires the presence of multiple layers of the same color (e.g. red on red, blue on blue etc.):
in the *Gunungan* there is no chromatic correspondence between the colors of the different layers.

↓

Evidence of a previous treatment of pictorial re-presentation of the entire work **to maintain its essence and to give a second life to the *Gunungan***

RESULTS and DISCUSSION: THE *GAPIT*: support and pictorial phases

Analysis with 3D optical microscope:
a wooden fraction and two bamboo fractions

Wooden handle and central portion of bamboo joined by a cotton yarn
(which is not anchored to parchment like other textile fibres);

Breack on the bamboo portion of the last 6.5 cm of the **upper part**;

Presence of alkyd pictorial film, the same used for parchment, in a succession of discontinuous and non-homogeneous layers.

Traditional technique

Javanese craftsmen usually, before completely replacing it**, recover the stability of the** *gapit* **by wrapping a cotton yarn around the area that presents the continuity solution.**

The techniques for creating the *gapit* show the **total absence of a passage of pictorial decoration on the support element**.

The *Gapit* was in use at the time of drafting the second pictorial phase on the parchment: the coloring of the stick is an unusual operation.

The overpaint could be made to give more uniformity to the different wooden species.

RESULTS and DISCUSSION: BINDING SYSTEM

Traditional technique

It has been hypothesized that some **binding threads** are not contemporary with the creation of the object, since they show a different **color**, **count** and **twist** than the others.

In the case of the knot that joins the two portions of *gapit*, bamboo-wood, the color is attributable to the second pictorial phase performed on the parchment, which as described above also included the *gapit*.

Yarns of vegetable origin, with the same mechanical characteristics and not dyed

There is no evidence to prove which yarns are contemporary to the object itself and to date the *Gunungan*

PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- Wet cleaning of the second pictorial phase;
- Removing natural terpene paint stains;
- Humidification;
- Retouching.

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

GOALS

The restoration treatments was calibrated to the end
TO MAINTAIN AND CONSOLIDATE BOTH PICTORIAL PHASES

- **To restore**, through consolidation, **continuity and homogeneity to the pictorial film of the first pictorial phase**
- **Reposition the partially detached flakes of the second painting phase**
- **Restore** some of the lost **flatness to the parchment**
- **Enhance the original color**
- **Protect the work from possible future thermohygrometric changes**

PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- **Pre-consolidation of the paint film;**
- Consolidation of the two pictoral phases;
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- Removing natural terpene paint stains;
- Humidification;
- Retouching.

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

The areas with flake adhesion defects were pre- contolidated using **strips of 11 g/m2 Japanese paper and Klucel G adhesive at 4% in water (w/v)**, selected after testing.

The areas in yellow highlight the pre-consolidation strips

PHASES OF THE RESTORATION TREATMENTS

FIRST PICTORIAL PHASE

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- **Consolidation of the two pictoral phases;**
- Wet cleaning the second pictorial phase;
- Removing natural terpene paint stains;
- Humidification;
- Retouching.

ON THE *GAPIT*

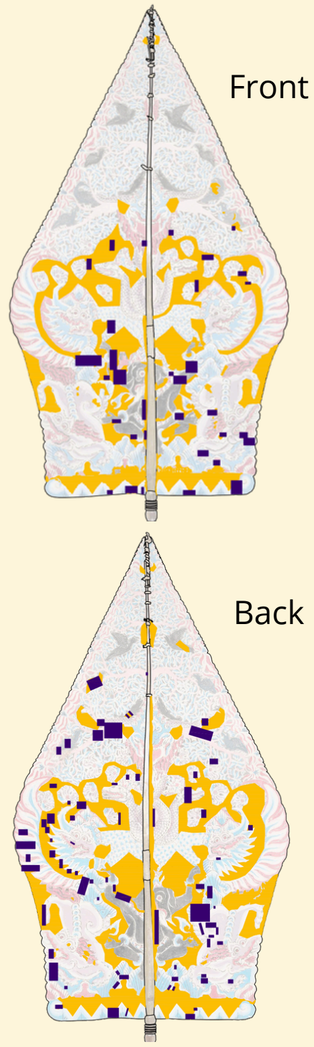
- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Consolidation of the first pictorial phase by brushing with **2% Funori in deionized water (w/v)**, selected after testing.

Brush application of the consolidant



Graphic documentation of the consolidation treatments of the two pictorial phases: the intervention on the **first phase is in yellow**

PHASES OF THE RESTORATION TREATMENTS

SECOND PICTORIAL PHASE

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- **Consolidation of the two pictoral phases;**
- Wet cleaning the second pictorial phase;
- Removing natural terpene paint stains;
- Humidification;
- Retouching.

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Local humidification and re-adhesion of the partially dead flakes using **Klucel G at 6% in deionized water (w/v),** selected after testing.

Stratigraphy of the localized humidification system:

1) Save-tex® membrane, positioned with the felt side towards the absorbent paper;

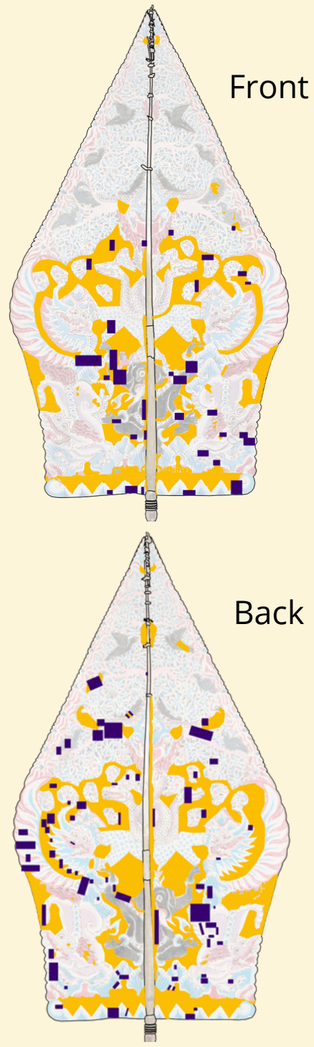
2) absorbent paper soaked in deionized water;

3) Melinex®;

4) weight.

Detail from before:
still visible pre-consolidation

After humidification e
re-adhere through Klucel G 6% in water deionized (w/v)



Graphic documentation of the consolidation treatments of the two pictorial phases: the intervention on the second **phase is in purple**

PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- **Wet cleaning of the second pictorial phase;**
- Removing natural terpene paint stains;
- Humidification;
- Retouching.

ON THE *GAPIT*

- Dry cleaning (with sponges);
- **Wet cleaning;**
- **Retouching.**

ON THE BINDING SYSTEM

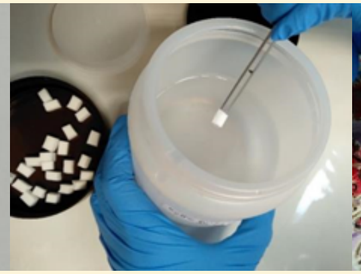
- Dry cleaning (with museum vacuum cleaner).

Wet claning with **Bis-Tris buffer solution at pH 6.0 and conductivity 400 µS/cm gelled with Gellan at a concentration of 3%**, selected after testing, as it guarantees the supply of water in a gradual, controlled and localized manner at the interface with the alkyd paint layer.

Rinse with a latex free PU sponge dipped in the same buffer solution.

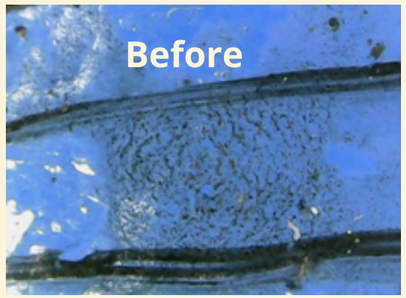
Placing a portion of Gellan on the area to be treated

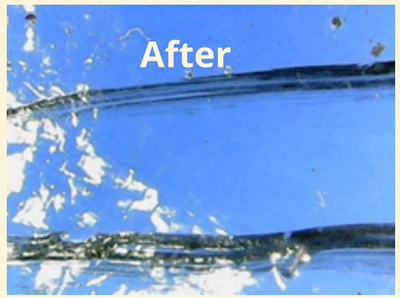
The gum gel is dirty after use



Latex free PU sponge dipped in pH 6 buffer solution

Rinse the area treated with Gellan using the sponge dipped in buffer solution





PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- Wet cleaning of the second pictorial phase;
- **Removing natural terpene paint stains;**
- Humidification;
- Retouching.

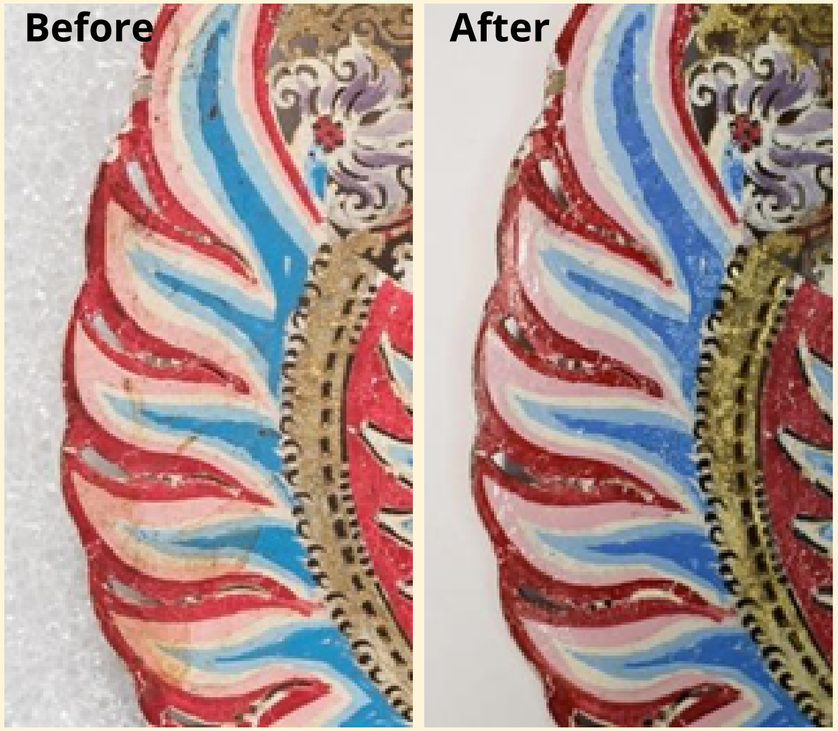
ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Wet cleaning removal with a **pH 7.5 buffer solution thickened with 6% Klucel G**, selected after testing.



PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- Wet cleaning of the second pictorial phase;
- Removing natural terpene paint stains;
- **Humidification;**
- Retouching.

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Front

PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- Wet cleaning of the second pictorial phase;
- Removing natural terpene paint stains;
- **Humidification;**
- Retouching.

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- Retouching.

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Back

PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- Wet cleaning of the second pictorial phase;
- Removing natural terpene paint stains;
- Humidification;
- **Retouching.**

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- **Retouching.**

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Retouching with watercolor only on areas
with light visible preparation.
The areas were adequated creating a **neutral color similar to parchment,**
visible in the gaps of the first pictorial phase.

Before **After**

Before **After**

PHASES OF THE RESTORATION TREATMENTS

ON THE PAINTED PARCHMENT

- Pre-consolidation of the paint film;
- Consolidation of the two pictoral phases;
- Wet cleaning of the second pictorial phase;
- Removing natural terpene paint stains;
- Humidification;
- **Retouching.**

ON THE *GAPIT*

- Dry cleaning (with sponges);
- Wet cleaning;
- **Retouching.**

ON THE BINDING SYSTEM

- Dry cleaning (with museum vacuum cleaner).

Retouching with watercolor only on areas
with light visible preparation.
The areas were adequated creating a **neutral color similar to parchment,**
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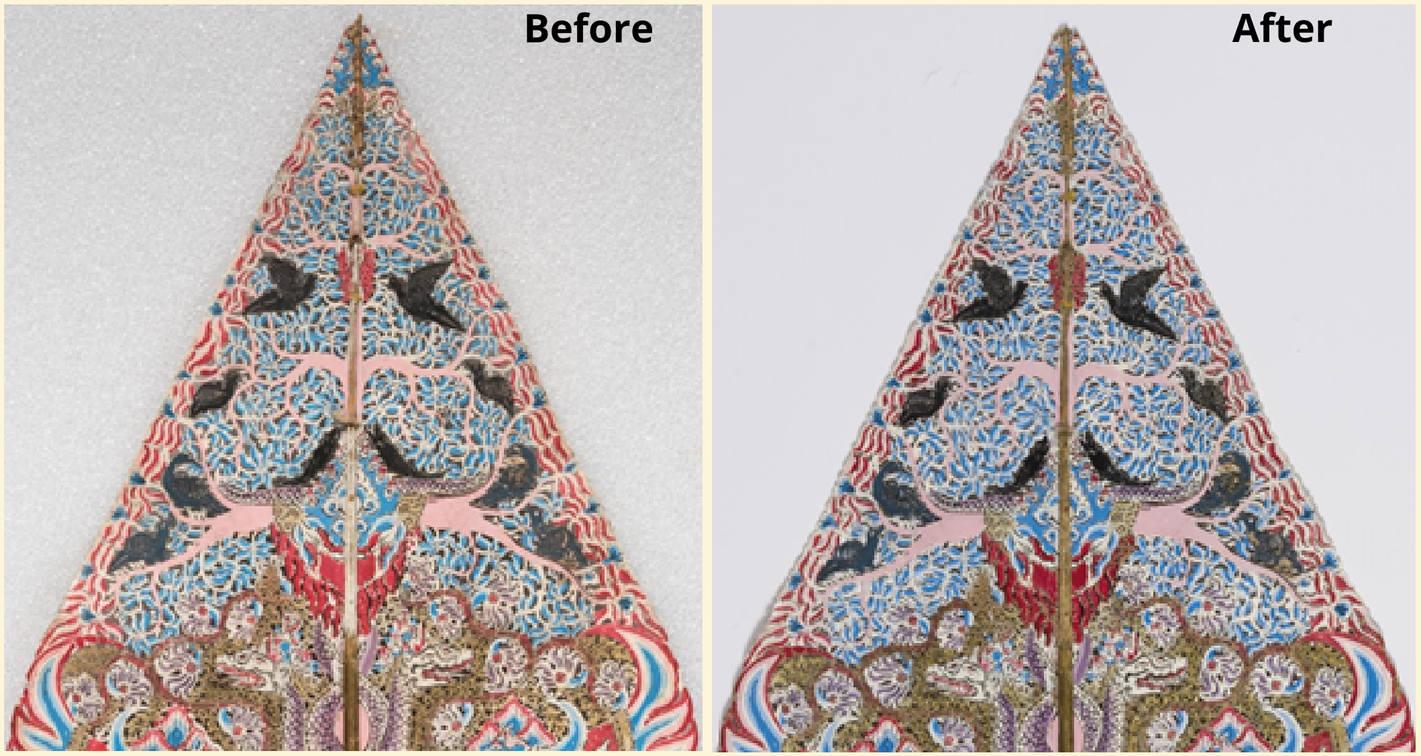


CUSTOMIZED STORAGE BOX

The design of the ideal conservative box for a *Wayang Kulit* shape **should meet the following criteria**:

- **accessibility to the work** should always be guaranteed, without taking too much time and without causing damage to the contents and the box;
- **monitoring** should be done **easily** without taking too much time;
- **manipulation of the work should be possible without unnecessary contact or effort**;
- **in the event that the work cannot be kept in an air-conditioned room, it is best to insulate the conservative box** as much as possible, in order to prevent the work from being subject to fluctuations in temperature and humidity.

3 mm single-wall non-acid cardboard box insulated with 25 and 50 mm non-acid polyethylene.

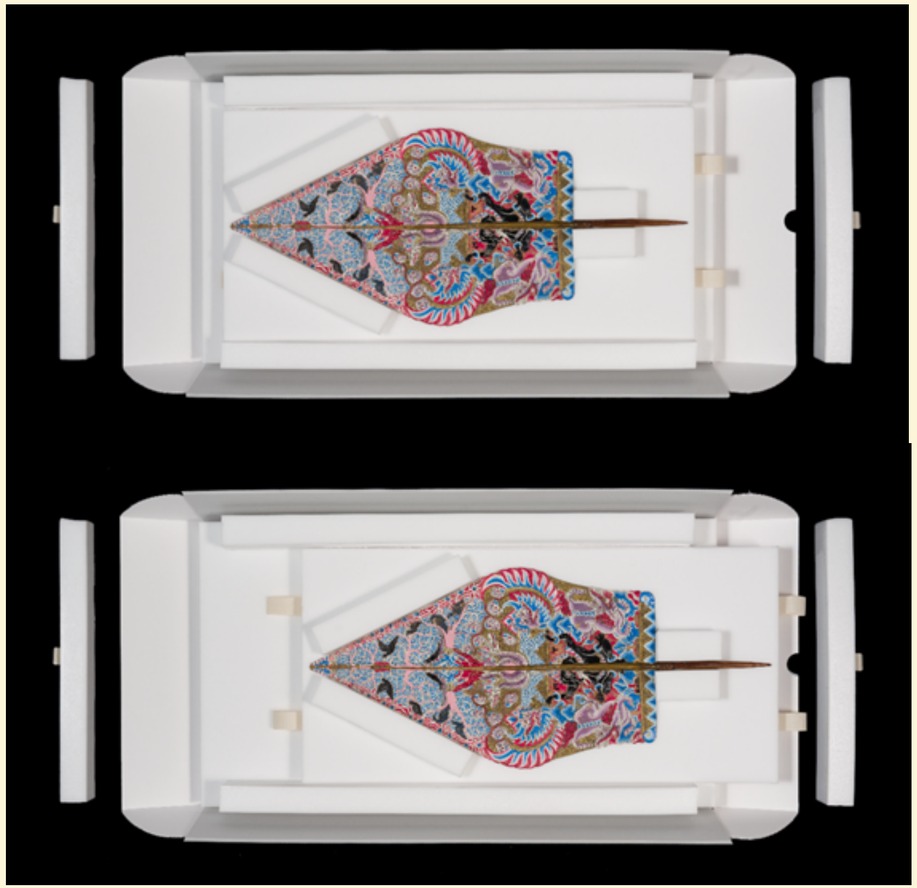
The container has been designed to easily open both short sides, without lifting the lid, thanks to a closing system with a cotton canvas tape and a Velcro (hook and loop closure).

The conservative box: on the left the insulated lid, on the right the base of the insulated box on which the removable tray with the Gunungan was placed

CUSTOMIZED STORAGE BOX

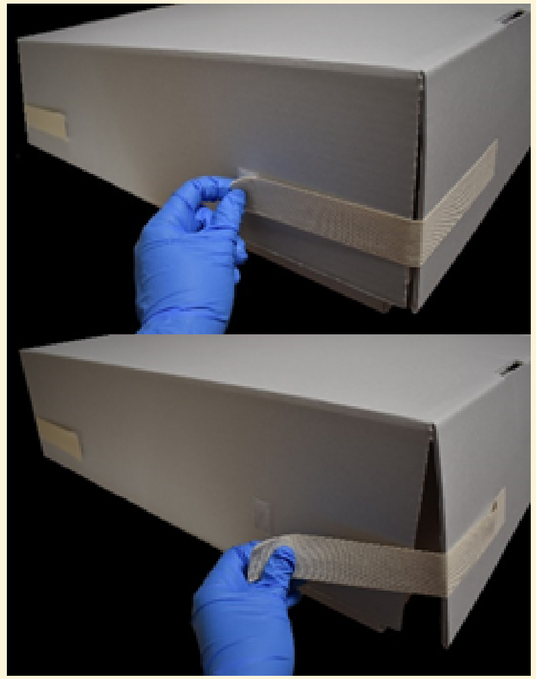
3 mm single-wall non-acid cardboard box insulated with 25 and 50 mm non-acid polyethylene.

The container has been designed to easily open both short sides, without lifting the lid, thanks to a closing system with a cotton canvas tape and a Velcro (hook and loop closure).



Short sides lowered: allows easily to take the tray with the work

The lid with the four corners open



Velcro opening on one of the four corners

Thank you for your attention!

Front:
before and after the restoration treatmens

Back:
before and after the restoration treatmens