

Master's Thesis

An Analysis of Unidentified Dark Materials
Between Inlaid Motifs on Andean Wooden *Qeros*



Heather White, 2016 Graduate
*UCLA/Getty MA Program in the Conservation
of Archaeological and Ethnographic Materials*



Introduction to *Qeros*

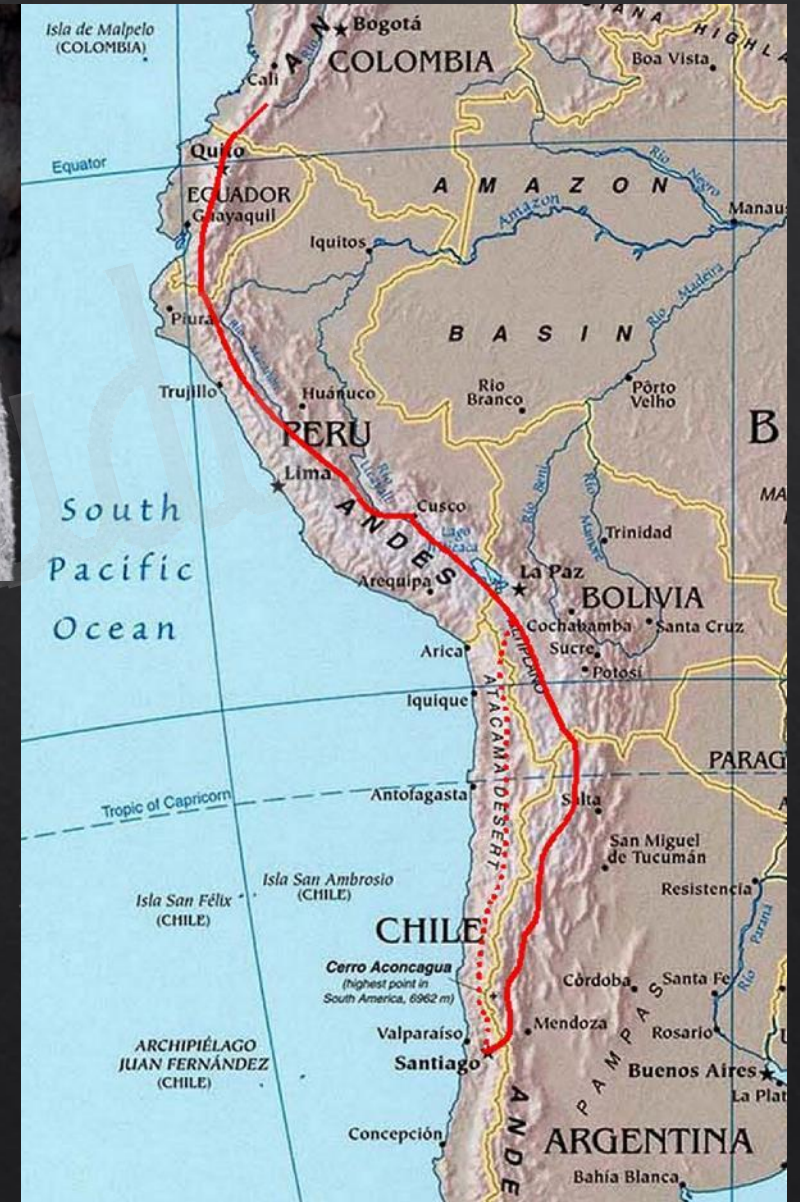
Qeros are wooden cups made in pairs by Andean societies for use in ritual activities.

Also spelled *kero*, *quero*, *q'ero*, *qquero* or *k'ullu qero*, translating as “wooden cup for drinking.”



Inka Period
1425-1532 C.E.

Colonial Period
1530-1780 C.E.



The Inka road system (red), along which *qeros* were produced and used.

Questions Considered

- What is the dark material observed on the surfaces, typically in “background” areas?
- If intentional “background”, why is the dark material absent in peculiar ways and why do conservators note “scraping”?

Absence/loss of dark background



Brooklyn Museum (36.357)



Carlos Museum, Emory University (1993.3.148)

“Most of the background areas are inlaid with brown lacquer [mopa mopa].”

—John Rowe (1961), *The Chronology of Inka Wooden Cups*



Research into *Qero* Use and Care

Ayllu Soraga, provincia de Avaroa, departamento de Oruro, Bolivia



Photos courtesy of Gerardo A. Mora Rivera,
Universidad San Sebastian

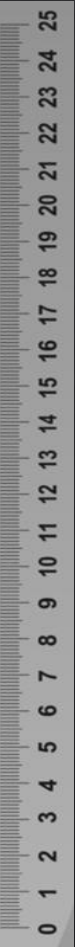
Ritual and Reciprocity

“The custom of toasting others with drink was a common practice, the giver of the toast making his way over to the favored one with two full [*qeros*], one of which he offered and one of which he drank himself.”

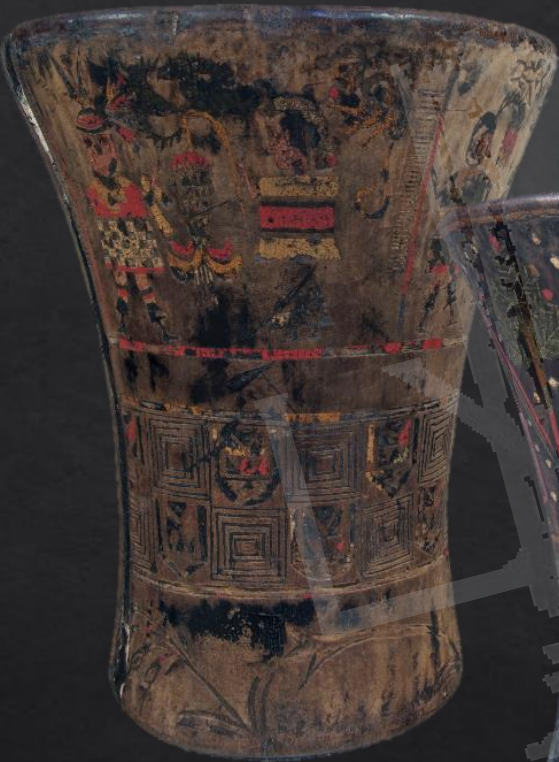
—Burr Brundage (1967), *Lords of Cuzco: The History and Description of the Inca People in their Final Days*

UCLA's Fowler Museum *Qeros*

Early Colonial –Late Colonial
(1530~1780 C.E.)



cm



X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



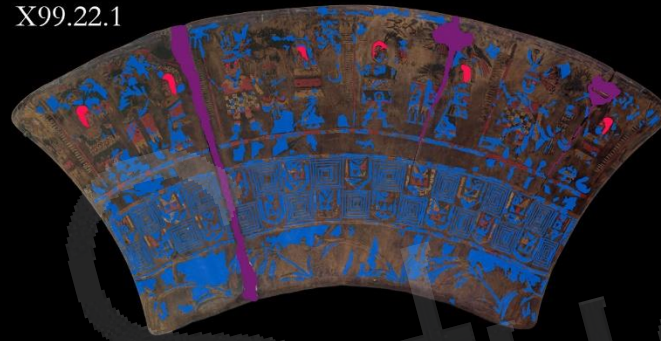
X99.22.11

Methodology

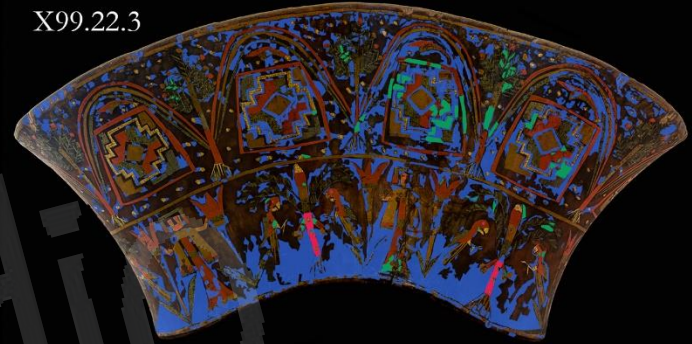
- Survey Forms with unifying language
- Visual Glossaries
- Digital Documentation (Regular and UV light)
- Rollout Photography
- Photoshop Mapping
- Reflectance Transformation Imaging (RTI)
- X-ray Fluorescence Spectroscopy (XRF)
- FTIR and GC-MS

All Dark Material over Exteriors of *Qeros*

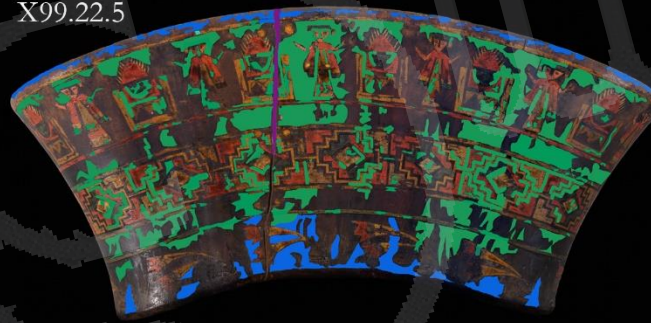
X99.22.1



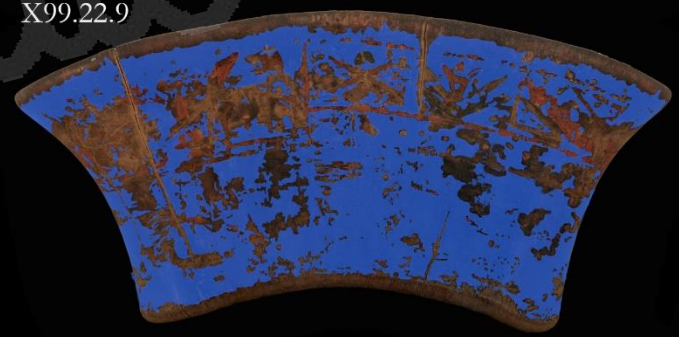
X99.22.3



X99.22.5



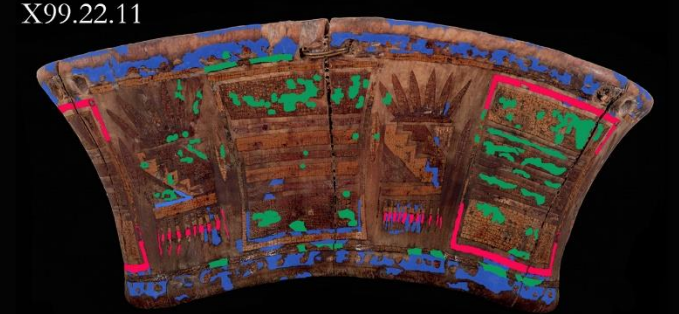
X99.22.9



X99.22.10



X99.22.11



Type #1



Type #2



Type #3



Type #4

Characterization, Analysis and Discussion of Dark Materials



Categorization of Surface Materials Studied

Exterior Surface	Major Visual Distinctions
Type #1 Dark Material	usually matte; dark color with purplish transitions
Type #2 Dark Material	glossy/resinous; dark color with reddish transitions
Type #3 Dark Material [Repairs]	repair material located at radial cracks; gummy/tacky
Type #4 Dark Material [Inlay]	used as inlay decoration; dark; matte
Gloss	glossy coating; brown-tinted; largely translucent
Interior Surface	
Type #3 Dark Material	repair material located at radial cracks; gummy/tacky
Type #5 Dark Material	usually quite thick; dark; matte; wrinkled or “blistering”

Material

Type #1 Dark Material

Visual Distinctions

usually matte; dark color with purplish transitions

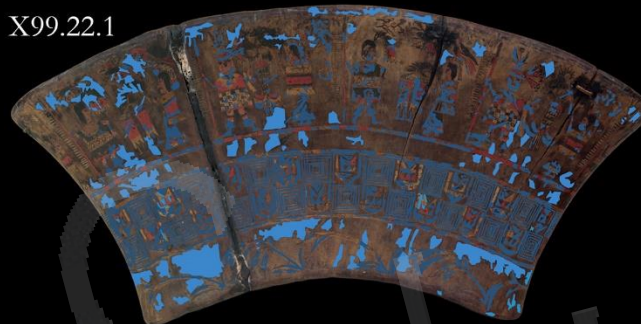
Condition Phenomena

Block-shaped losses, craquelure, efflorescence

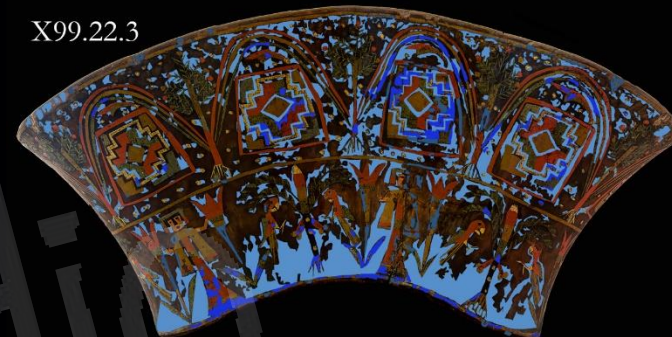


Type #1 Dark Material

X99.22.1



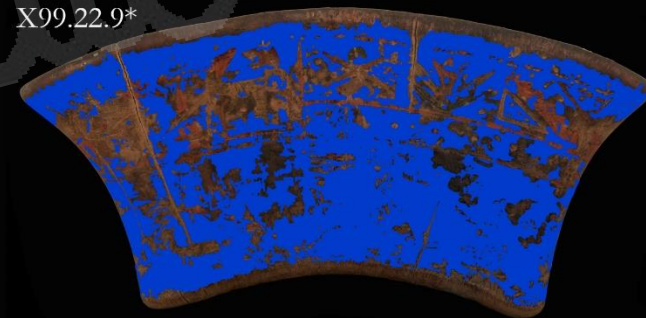
X99.22.3



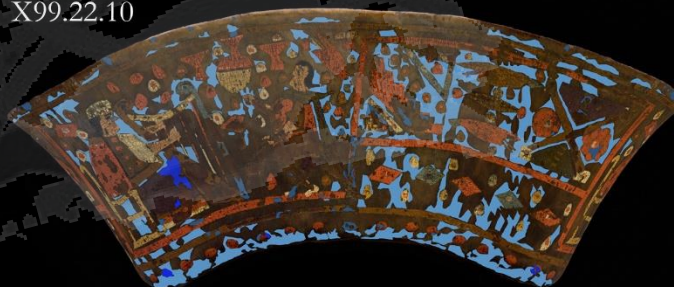
X99.22.5



X99.22.9*



X99.22.10



X99.22.11



Between
Inlay



Within
Recesses



Over
Inlay

Material

Type #1 Dark Material

Visual Distinctions

usually matte; dark color with purplish transitions

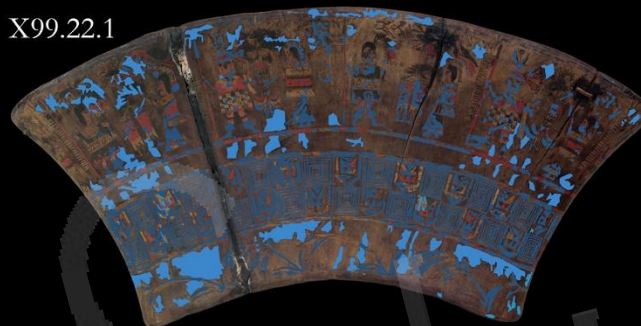
Condition Phenomena

Block-shaped losses, craquelure, efflorescence

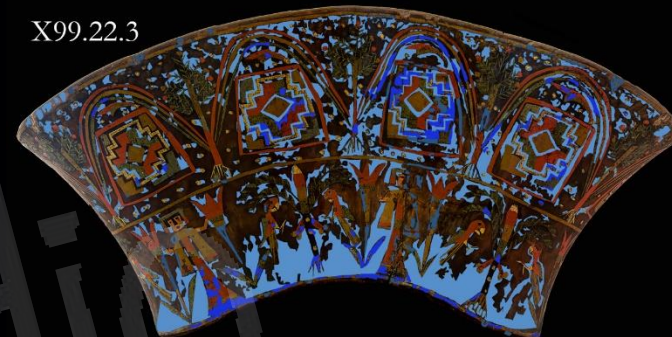


Type #1 Dark Material

X99.22.1



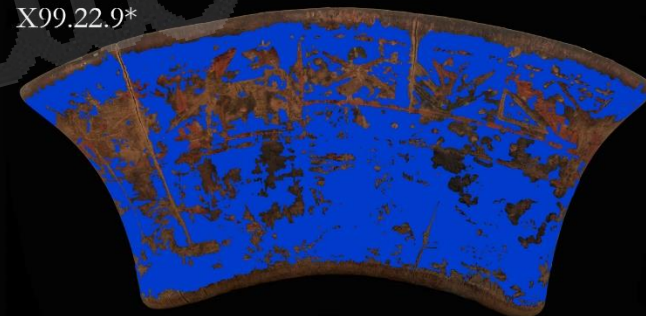
X99.22.3



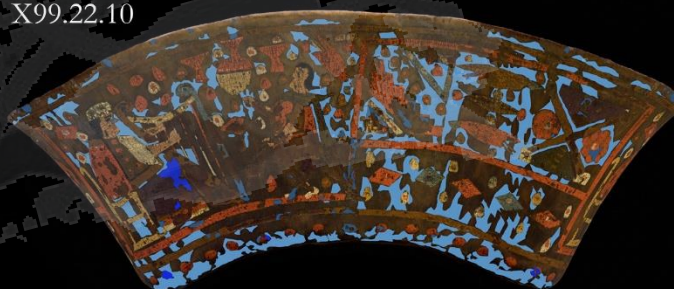
X99.22.5



X99.22.9*



X99.22.10



X99.22.11



Between
Inlay



Within
Recesses



Over
Inlay

Material

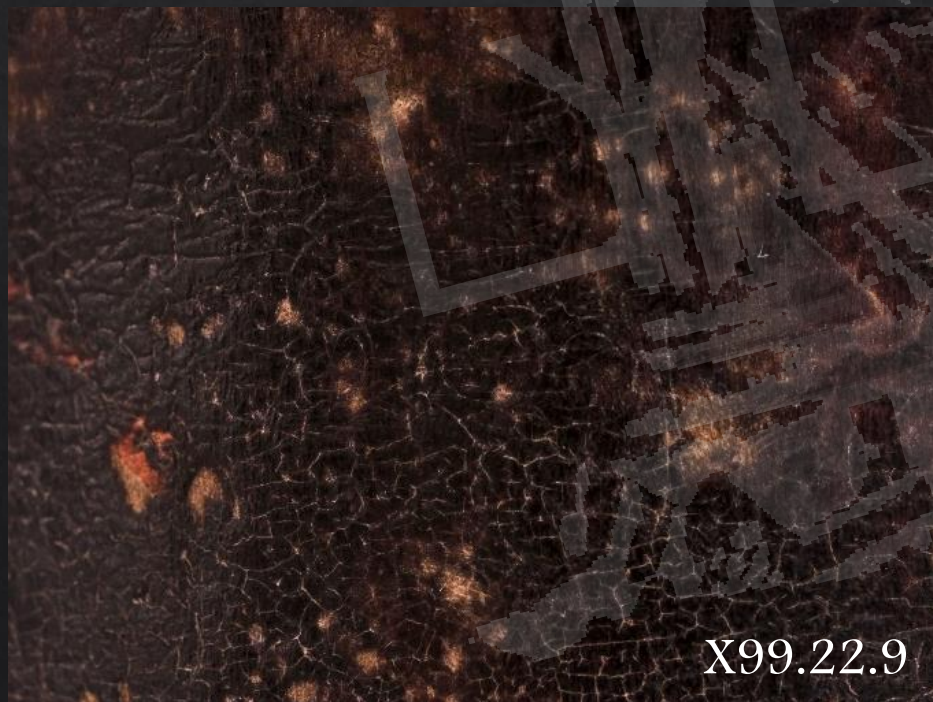
Type #1 Dark Material

Visual Distinctions

usually matte; dark color with purplish transitions

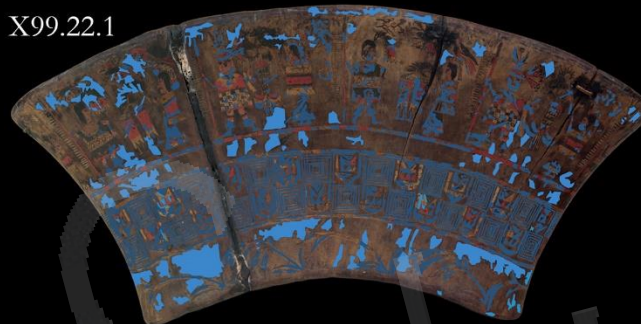
Condition Phenomena

Block-shaped losses, craquelure, efflorescence

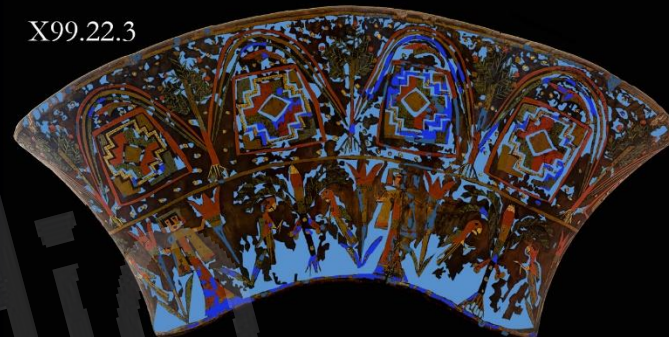


Type #1 Dark Material

X99.22.1



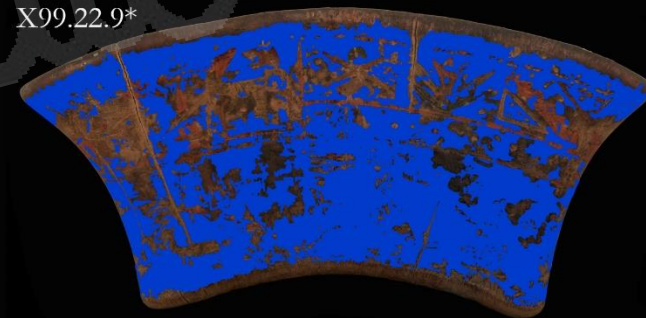
X99.22.3



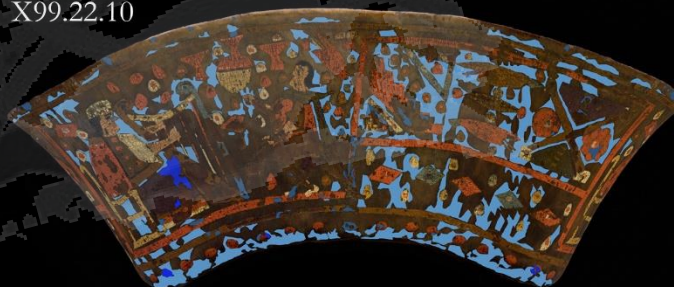
X99.22.5



X99.22.9*



X99.22.10



X99.22.11



Between
Inlay



Within
Recesses



Over
Inlay

Material

Type #1 Dark Material

Visual Distinctions

usually matte; dark color with purplish transitions

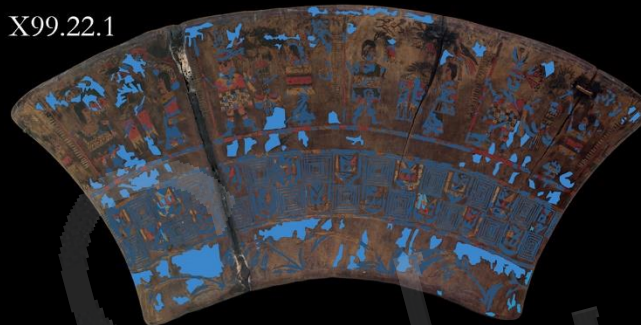
Condition Phenomena

Block-shaped losses, craquelure, efflorescence

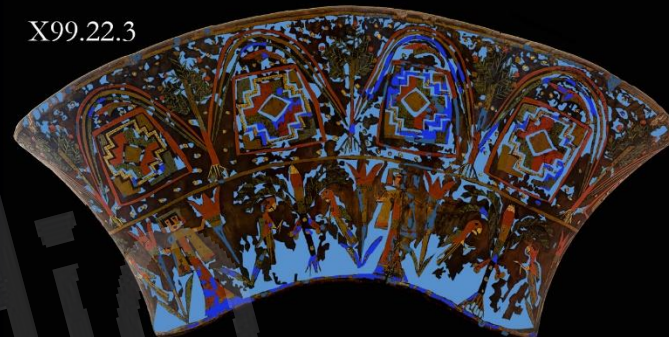


Type #1 Dark Material

X99.22.1



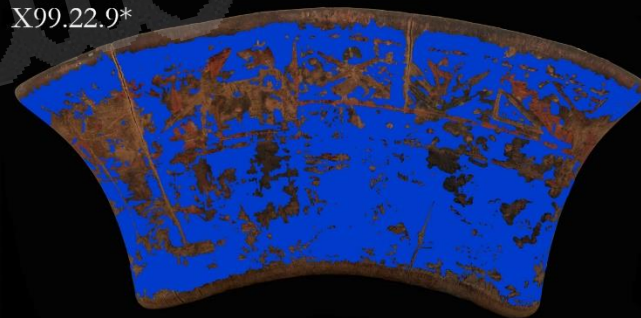
X99.22.3



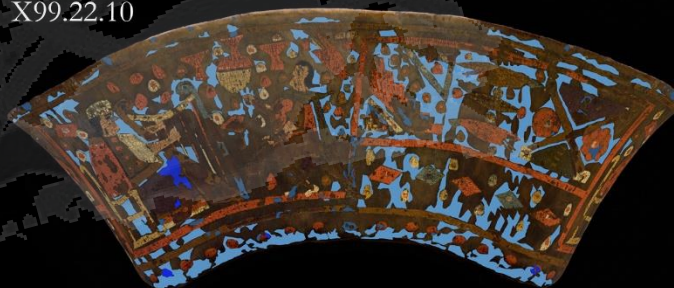
X99.22.5



X99.22.9*



X99.22.10



X99.22.11



Between
Inlay



Within
Recesses



Over
Inlay

Material

Type #1 Dark Material

Visual Distinctions

usually matte; dark color with purplish transitions

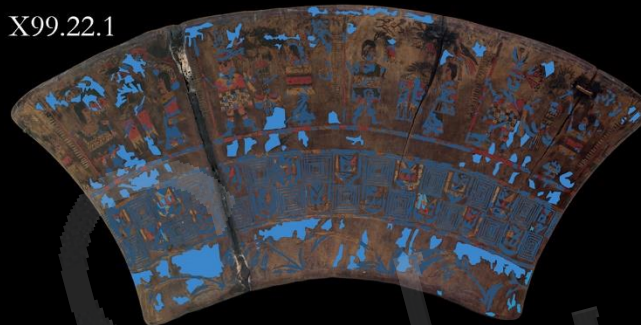
Condition Phenomena

Block-shaped losses, craquelure, efflorescence

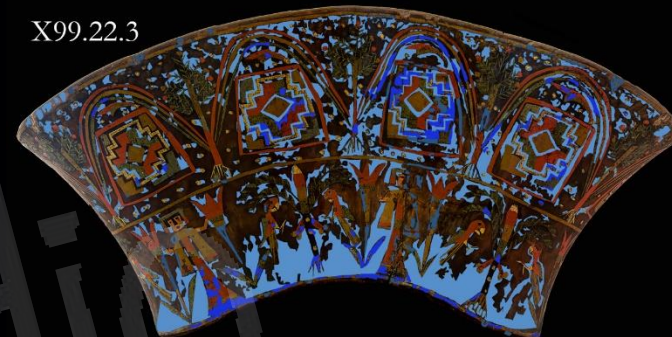


Type #1 Dark Material

X99.22.1



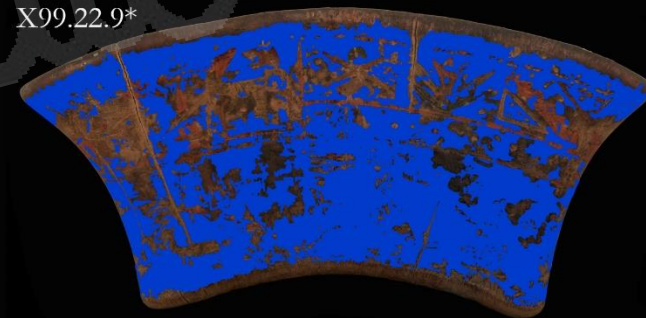
X99.22.3



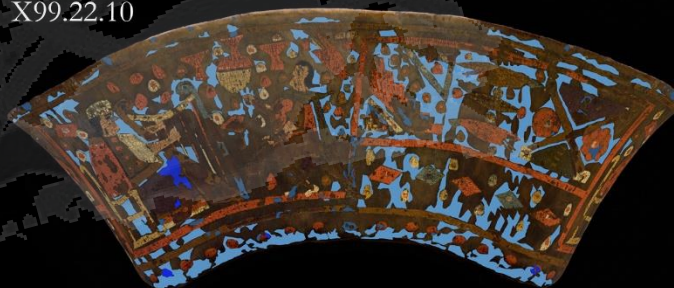
X99.22.5



X99.22.9*



X99.22.10



X99.22.11



Between
Inlay



Within
Recesses



Over
Inlay

Material

Type #2 Dark Material

Visual Distinctions

glossy/resinous; dark color with reddish transitions

Condition Phenomena

Bubbling



Type #2 Dark Material

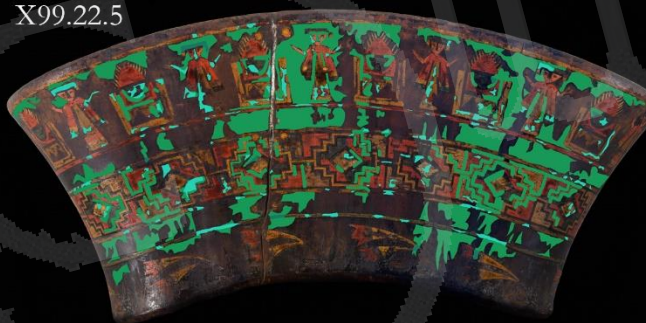
X99.22.1



X99.22.3



X99.22.5



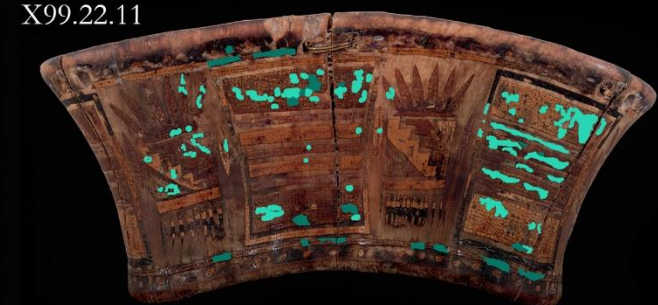
X99.22.9



X99.22.10



X99.22.11



Between
Inlay



Within
Recesses



Over
Inlay

<i>Material</i>
Type #2 Dark Material
<i>Visual Distinctions</i>
glossy/resinous; dark color with reddish transitions
<i>Condition Phenomena</i>
Bubbling

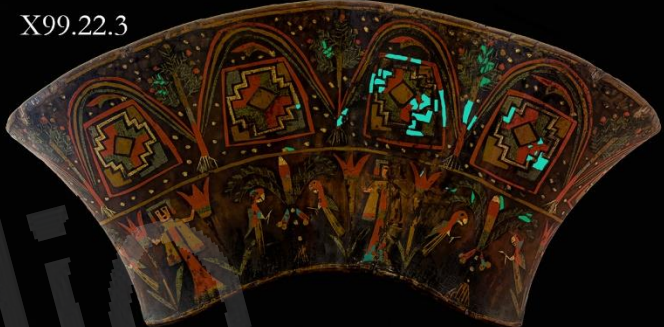


Type #2 Dark Material

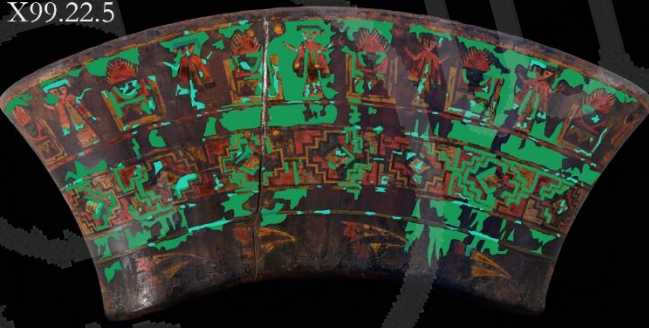
X99.22.1



X99.22.3



X99.22.5



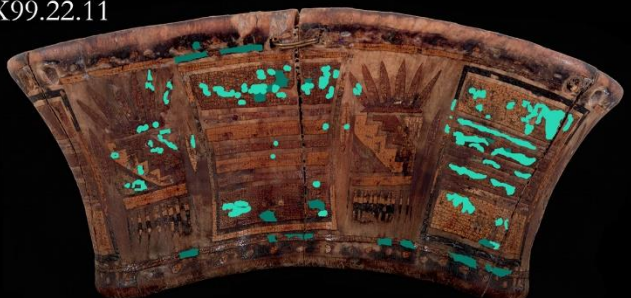
X99.22.9



X99.22.10



X99.22.11



 Between Inlay

 Within Recesses

 Over Inlay

<i>Material</i>
Type #2 Dark Material
<i>Visual Distinctions</i>
glossy/resinous; dark color with reddish transitions
<i>Condition Phenomena</i>
Bubbling

Type #2 Dark Material

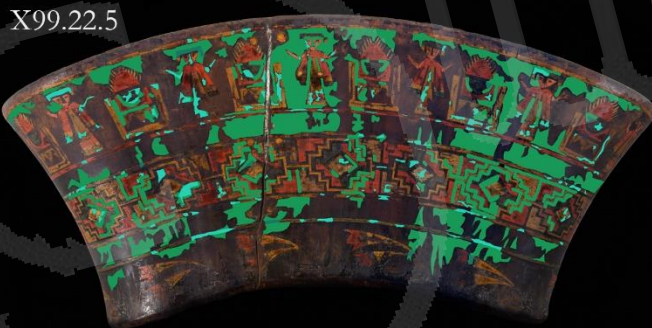
X99.22.1



X99.22.3



X99.22.5



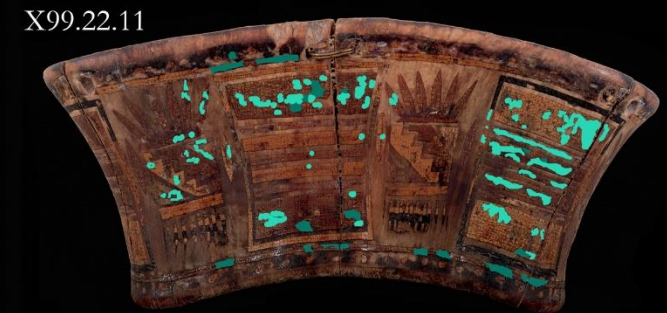
X99.22.9



X99.22.10



X99.22.11



X99.22.3

Between
Inlay

Within
Recesses

Over
Inlay

<i>Material</i>
Type #2 Dark Material
<i>Visual Distinctions</i>
glossy/resinous; dark color with reddish transitions
<i>Condition Phenomena</i>
Bubbling



X99.22.5

Type #2 Dark Material

X99.22.1

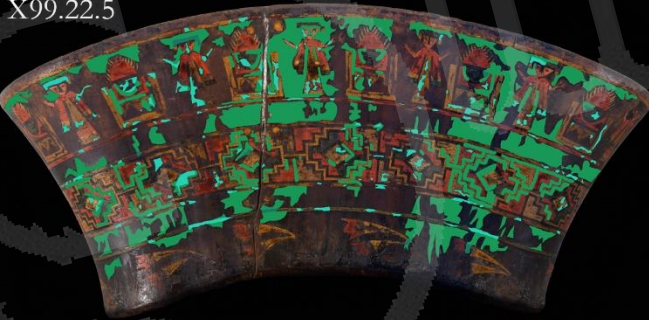


NONE

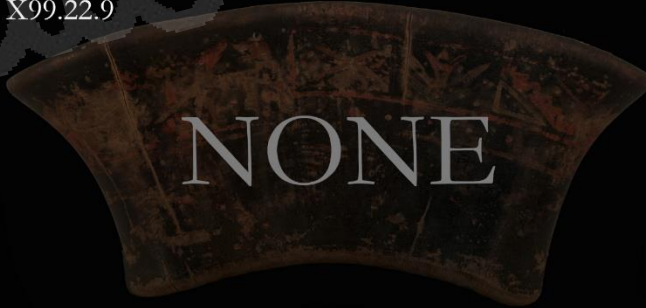
X99.22.3



X99.22.5



X99.22.9



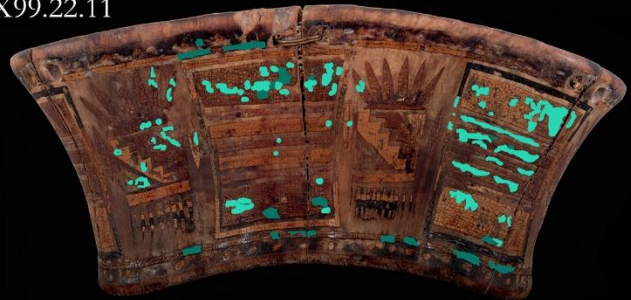
NONE

X99.22.10



NONE

X99.22.11



Between
Inlay

Within
Recesses

Over
Inlay

Material

Gloss

Visual Distinctions

glossy coating; brown-tinted; largely translucent

Condition Phenomena

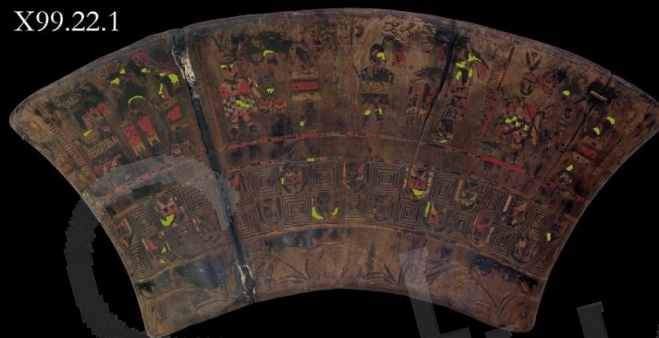
Visually Altered Color



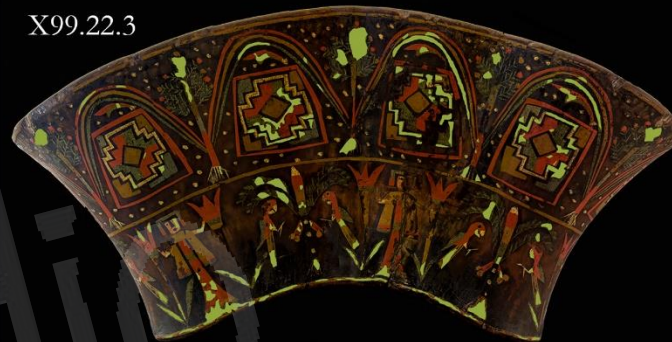
X99.22.5

Distributions of Gloss

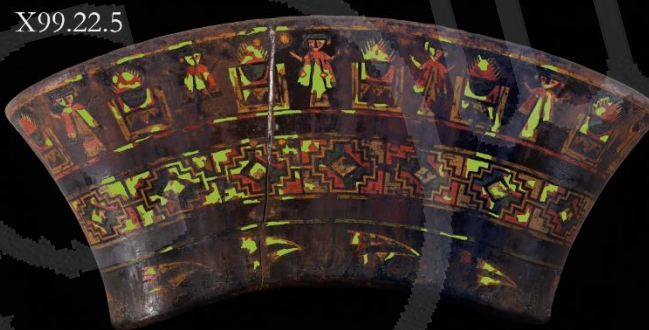
X99.22.1



X99.22.3



X99.22.5



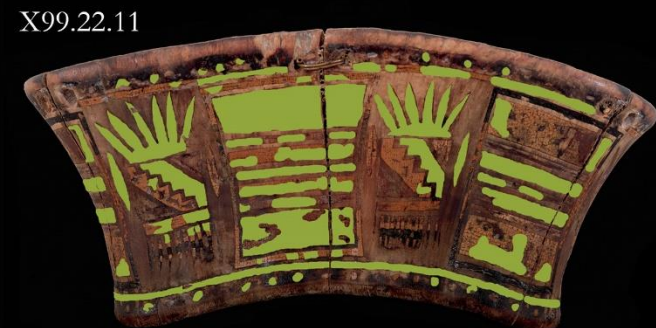
X99.22.9



X99.22.10



X99.22.11



NONE



Gloss

Material

Gloss

Visual Distinctions

glossy coating; brown-tinted; largely translucent

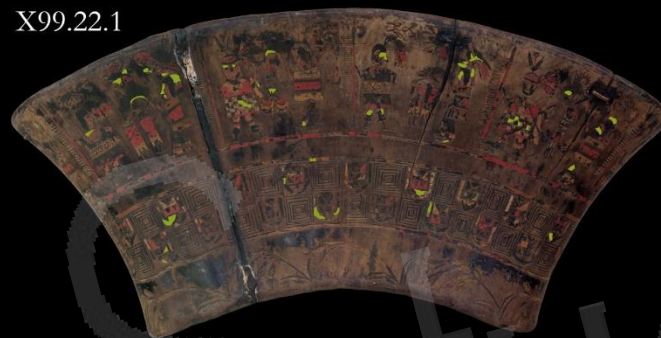
Condition Phenomena

Visually Altered Color

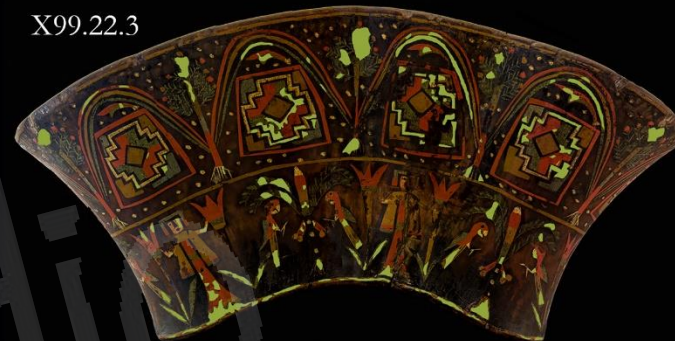


Distributions of Gloss

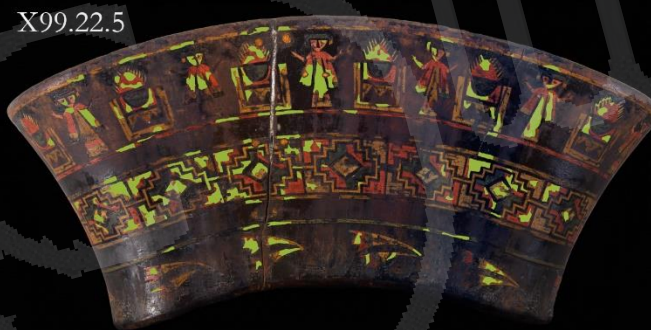
X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



X99.22.11



NONE



Gloss

Material

Gloss

Visual Distinctions

glossy coating; brown-tinted; largely translucent

Condition Phenomena

Visually Altered Color

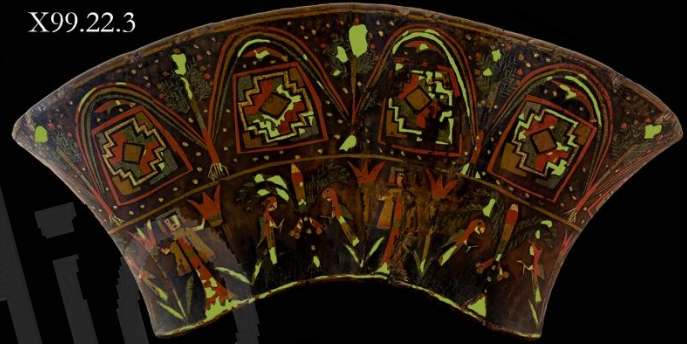


Distributions of Gloss

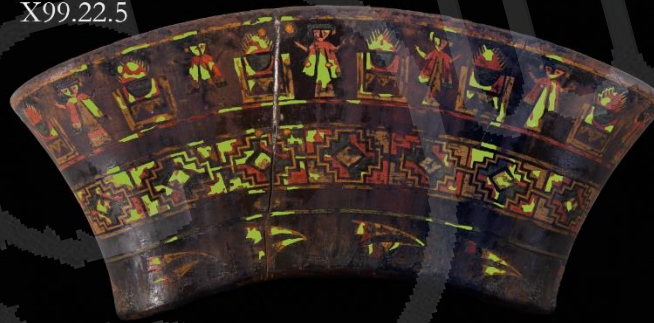
X99.22.1



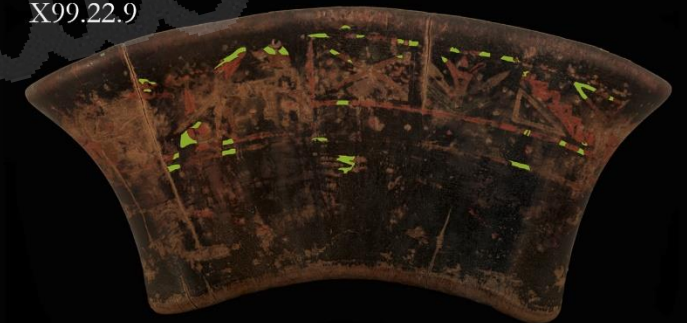
X99.22.3



X99.22.5



X99.22.9



X99.22.10



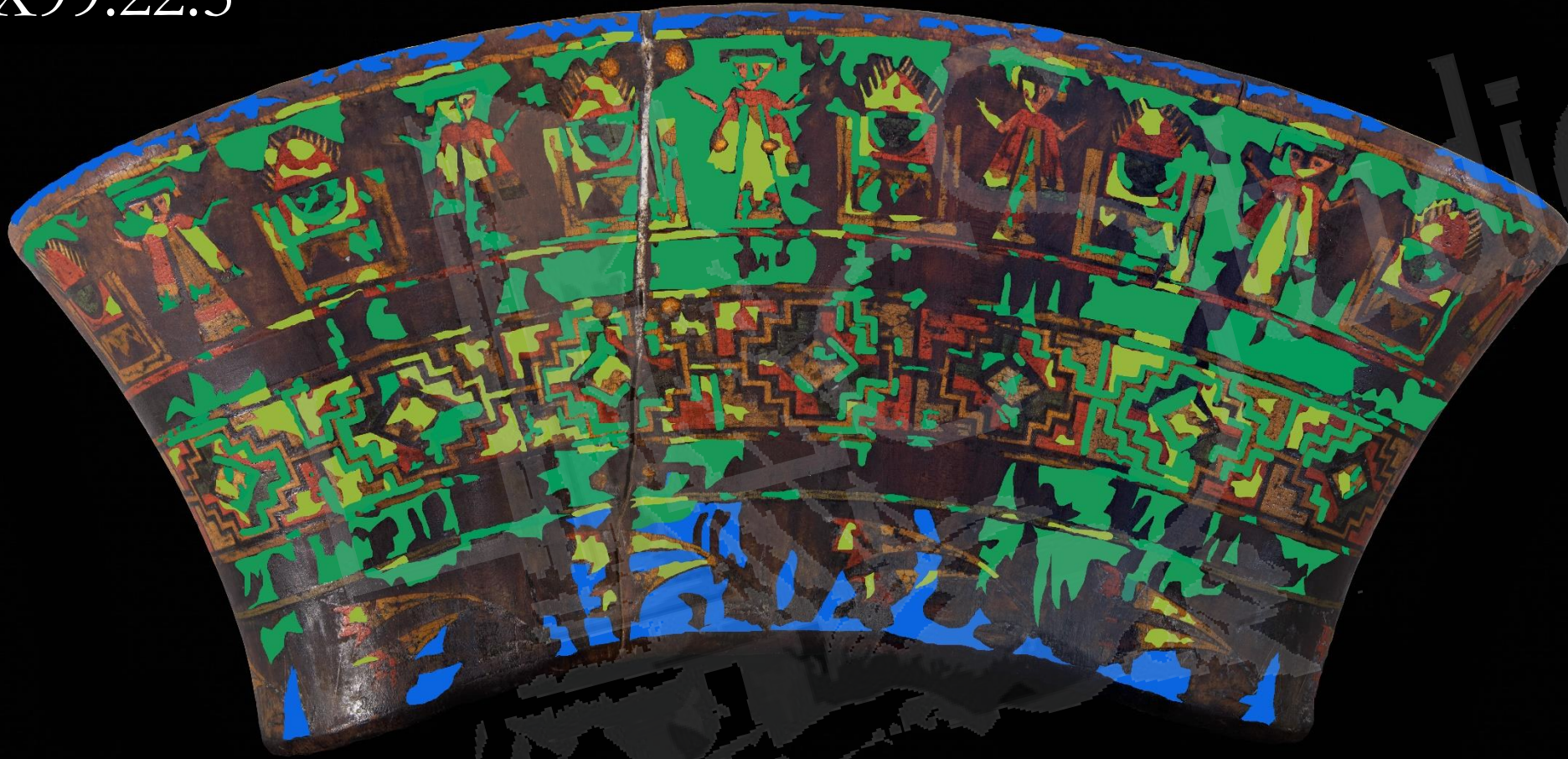
X99.22.11



Gloss

Relationships

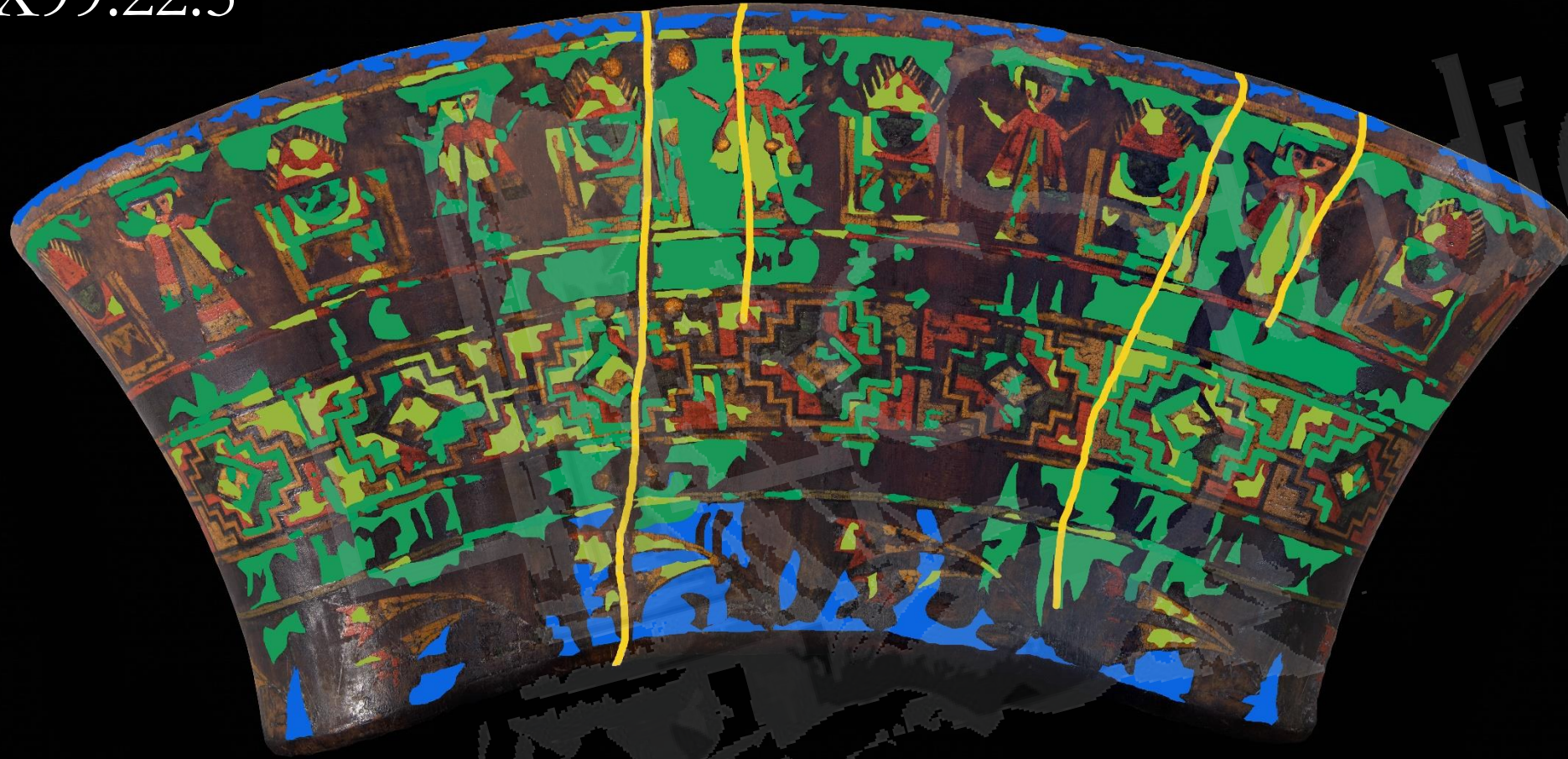
X99.22.5




-  Gloss
-  Type #1
-  Type #2 or Gloss

Relationships

X99.22.5



-  Gloss
-  Type #1
-  Type #2 or Gloss
-  Radial Cracking

Material

Type #3 Dark Material [Repairs]

Visual Distinctions

repair material located at radial cracks; gummy

Condition Phenomena

Efflorescence



Radial Cracks and Ethnographic Repair Materials

X99.22.1



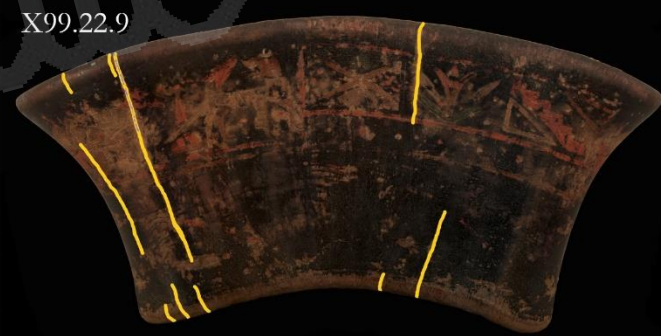
X99.22.3



X99.22.5



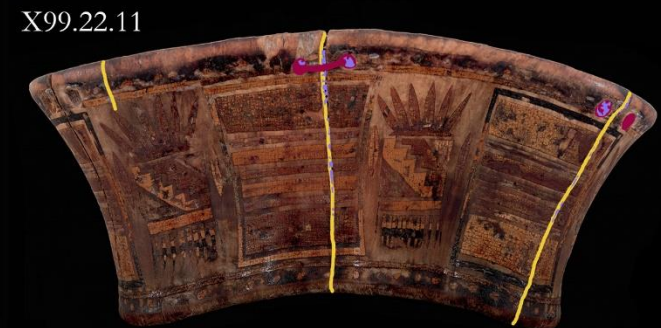
X99.22.9



X99.22.10



X99.22.11



Radial
Cracking



Type #3



Other Fill
Material



Staple
Repair

Material

Type #3 Dark Material [Repairs]

Visual Distinctions

repair material located at radial cracks; gummy

Condition Phenomena

Efflorescence



Radial Cracks and Ethnographic Repair Materials

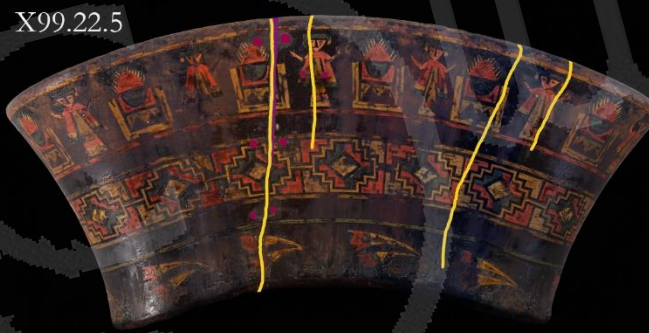
X99.22.1



X99.22.3



X99.22.5



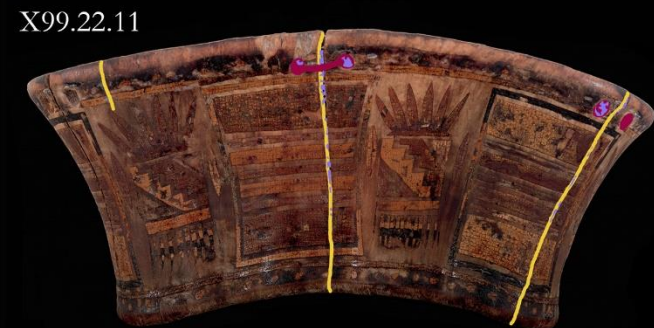
X99.22.9



X99.22.10



X99.22.11



Radial
Cracking

Type #3

Other Fill
Material

Staple
Repair

Material

Type #4 Dark Material [Inlay]

Visual Distinctions

used as inlay decoration; dark; matte

Condition Phenomena

craquelure or absence of cracking



X99.22.3

Type #4 Dark Material

X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



X99.22.11



Inlay*

*All dark inlay, including inlay with characteristics of aged *mopa mopa* as well as inlay that looks physically different from *mopa mopa*.

Material

Type #4 Dark Material [Inlay]

Visual Distinctions

used as inlay decoration; dark; matte

Condition Phenomena

craquelure or absence of cracking



Type #4 Dark Material

X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



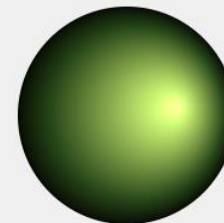
X99.22.11



Inlay*

*All dark inlay, including inlay with characteristics of aged *mopa mopa* as well as inlay that looks physically different from *mopa mopa*.

Reflectance Transformation Imaging X99.22.1



Light
x 0.48
y 0.08
Zoom
37%
Pan
x 0
y 0

Rendering mode

Luminance Unsharp Masking

Gain 44

Navigator

Bookmarks

File 22.1\RTI\AREA-2\finished-files\X-99-22-1_AREA-2.ptm

Size 3537 x 2791

Format LRGB PTM



Material

Type #5 Dark Material

Visual Distinctions

usually quite thick; dark; matte; wrinkled or “blistering”

Condition Phenomena

Blistering, craquelure, efflorescence



Results of Analysis

- 31 samples were analyzed
- Analysis by FTIR (and in some cases) GC-MS performed at the GCI and the MFA-Boston
- Analysis showed an overall uniform composition for all material “types” → a complex mixture of organic materials
- None were a match for *mopa mopa*. “Pattern C” → aged oils or oil + resin mixtures

<i>Type # 1</i>	<i>Type #2</i>	<i>Gloss</i>	<i>Type # 3</i>	<i>Type # 4</i>	<i>Type # 5</i>
Pattern C*	Pattern C	Pattern C	Pattern C	Pattern C	Pattern C
<i>Exceptions</i>					
X99.22.10→ several samples showed a spectrum for an <i>oil + protein</i> (<i>similar to egg white</i>)	X99.22.3 [Type #2 or Gloss] = Pullulan (a derivative of starch) X99.22.5 [Gloss] = oil		X99.22.5→ oxalates + oil	NONE	NONE

Characterization and Discussion of Condition Features



Categorization of Condition Features

Related to Dark Materials' Loss	
Abrasion*	*Interventions or Modifications
Block-shaped Losses	
Carved Marks*	
Scraping*	
Wear	
Related to Materials' Characterization	Associated with
Blistering	Type #5 Dark Material
Block-shaped Losses	Type #1 Dark Material
Bubbling	Type #2 Dark Material
Craquelure	Type # 1 Dark Material and <i>Mopa Mopa</i>
Efflorescence	Type #1 and #5 Dark Material
Pitting	<i>Mopa Mopa</i>
Visually Altered Color	<i>Mopa Mopa</i> , but caused by dark or glossy materials

Abrasion



Abrasion

X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



X99.22.11



Abrasion



Abrasion

X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



X99.22.11



Abrasion



Abrasion

X99.22.1



X99.22.3



X99.22.5



X99.22.9



NONE

X99.22.10

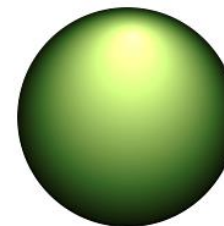


X99.22.11



Reflectance Transformation Imaging

X99.22.10



Light
x 0.06
y 0.76
Zoom
41%
Pan
x 0
y 0

Rendering mode

Luminance Unsharp Masking

Gain



71

Navigator

Bookmarks

File 2.10/RTI/AREA-1/finished-files/X99-22-10_AREA-1.ptm

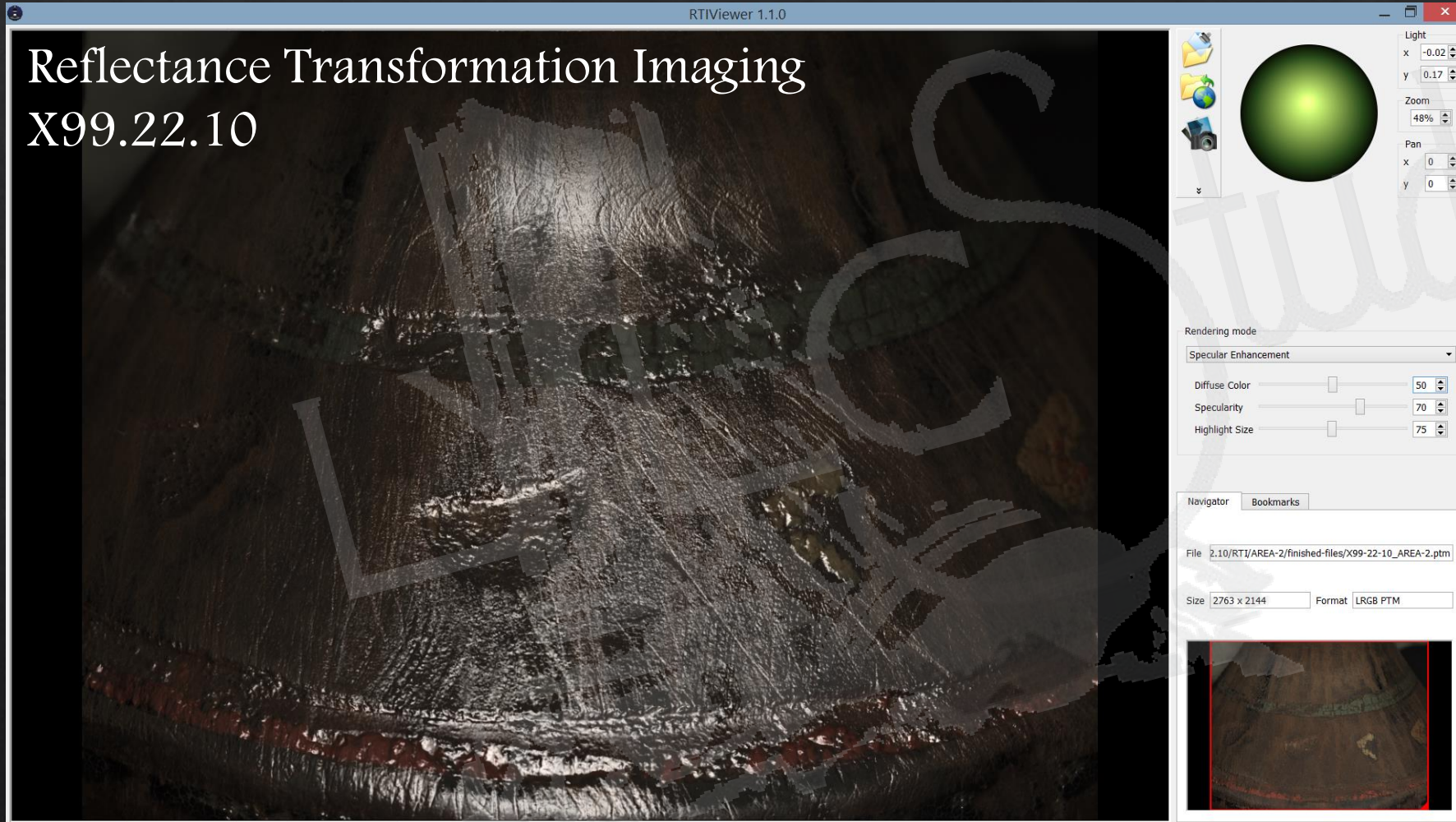
Size 1966 x 2496

Format LRGB PTM

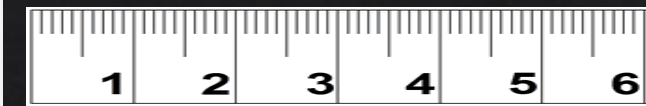


Abrasion

Reflectance Transformation Imaging X99.22.10



X99.22.10



cm

Abrasion

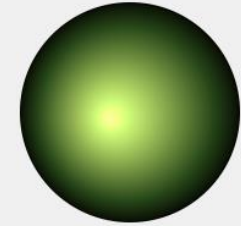


X99.22.10



cm

Reflectance Transformation Imaging X99.22.5



Light
x -0.19
y -0.06
Zoom
47%
Pan
x 0
y 0

Rendering mode

Specular Enhancement

Diffuse Color 50
Specularity 70
Highlight Size 75

Navigator

Bookmarks

File .22.5/RTI/AREA-2/finished-files/X99-22-5_AREA-2.ptm

Size 2868 x 2191 Format LRGB PTM



Scraping



Scraping

X99.22.1



X99.22.3



X99.22.5



X99.22.9



X99.22.10



X99.22.11



Scraping

Scraping

X99.22.10

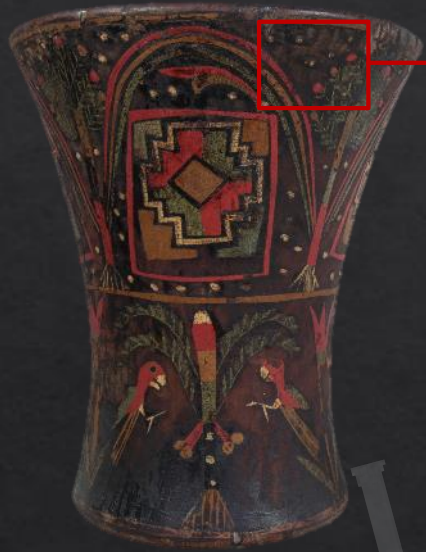


Scraping

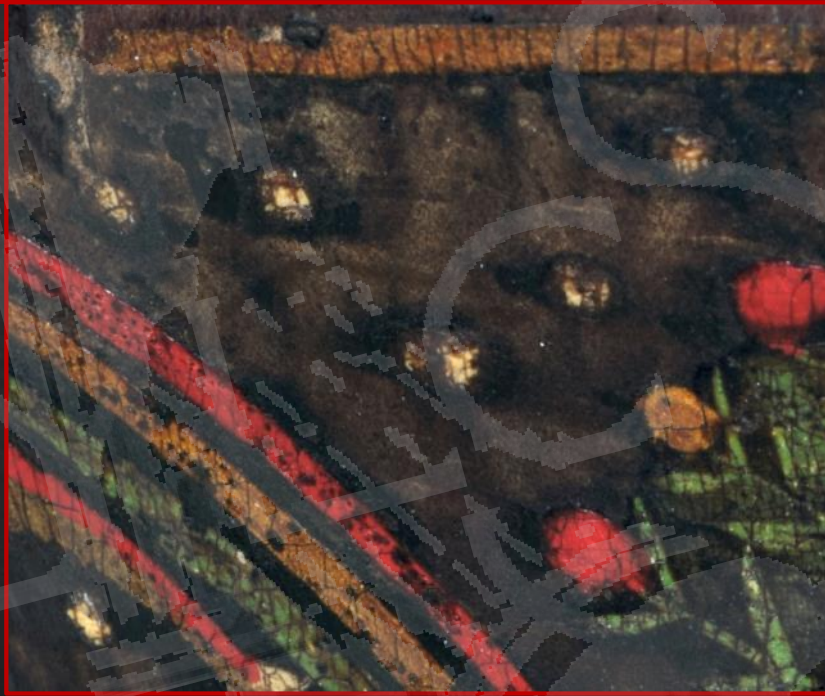
X99.22.10



Scraping



X99.22.3



Reflectance Transformation Imaging

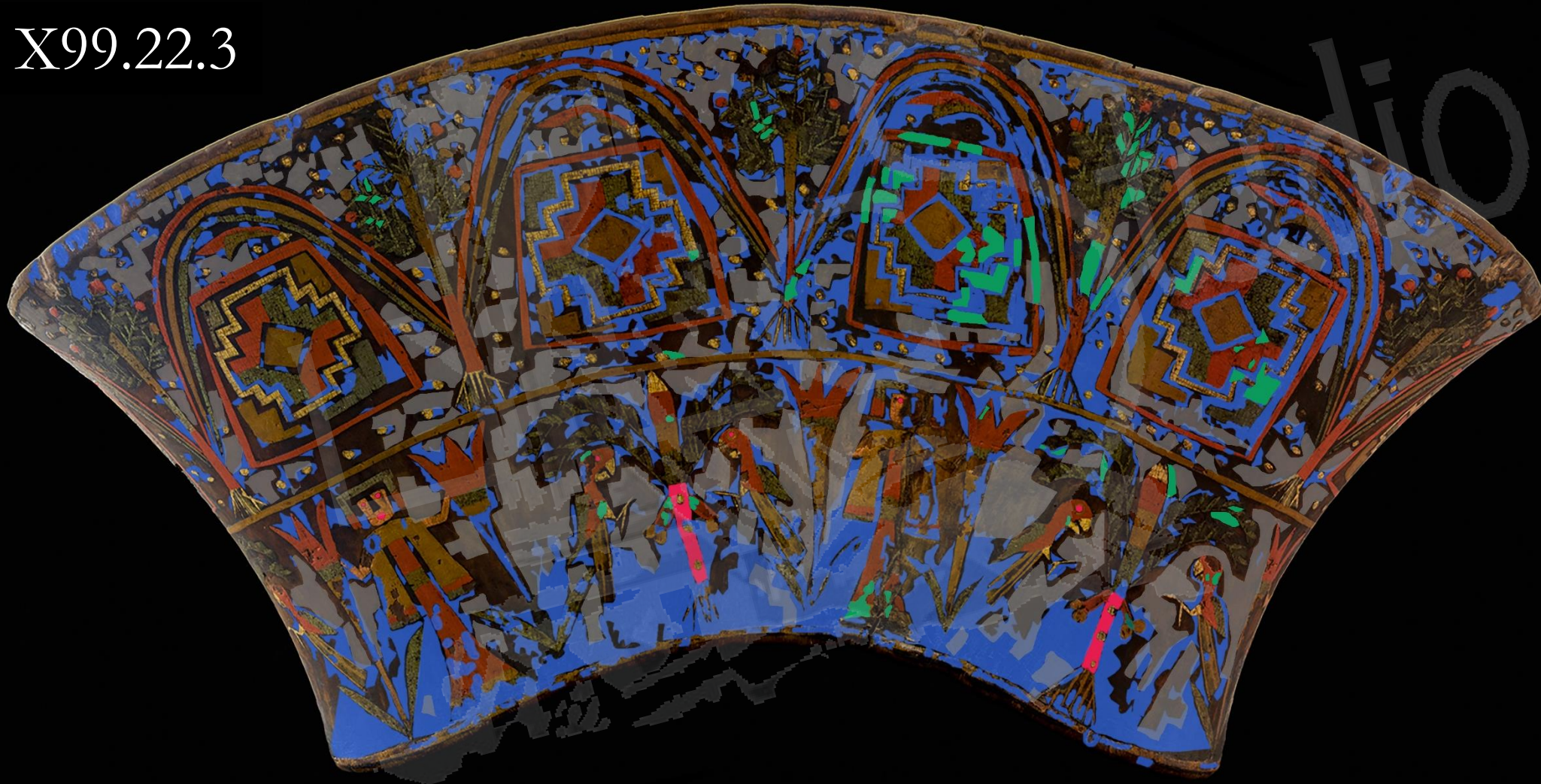
Scraping

Reflectance Transformation Imaging



Scraping vs. Dark Material

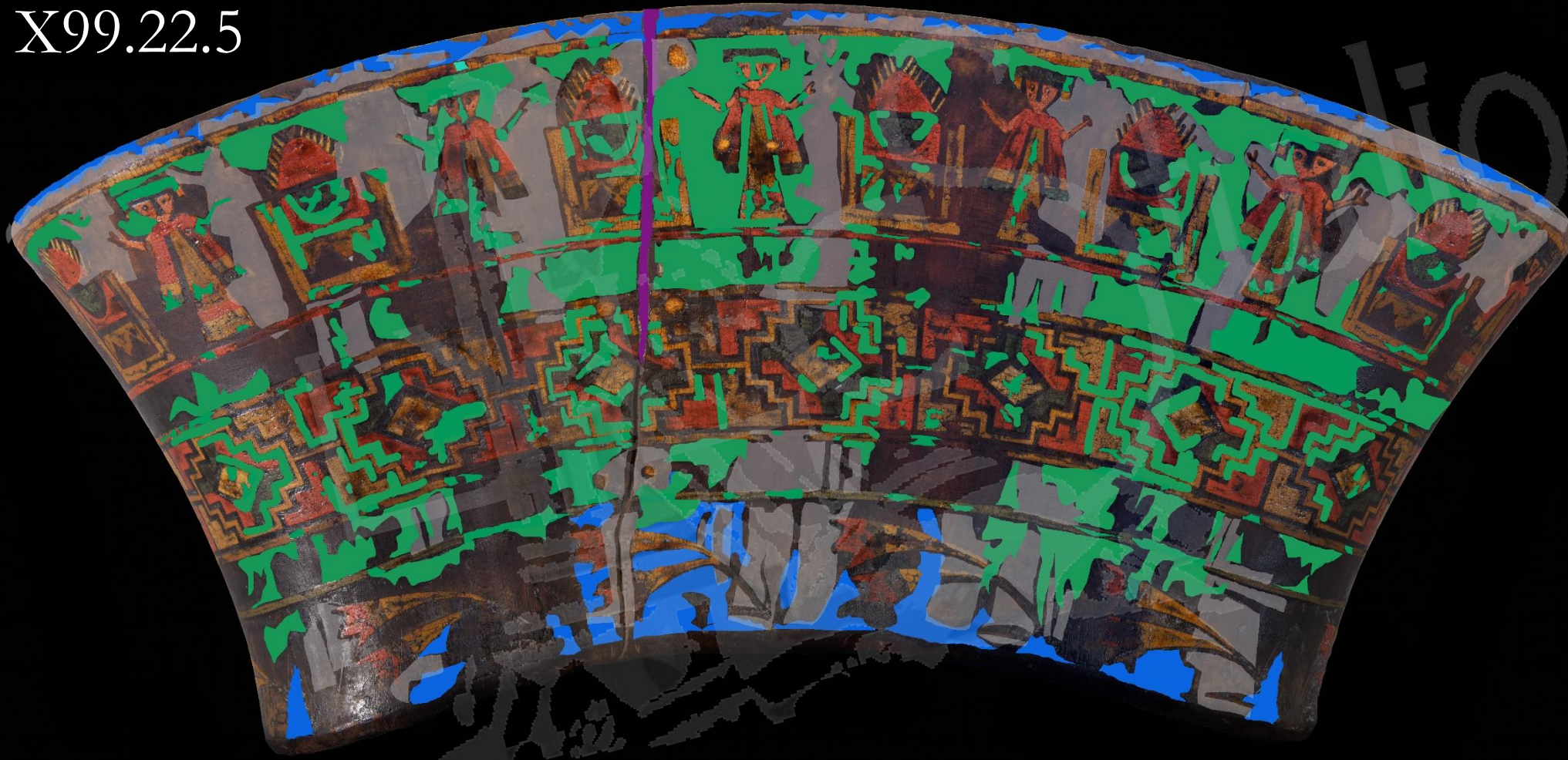
X99.22.3



- Type #1
- Type #2
- Type #4
- Scraping

Scraping vs. Dark Material

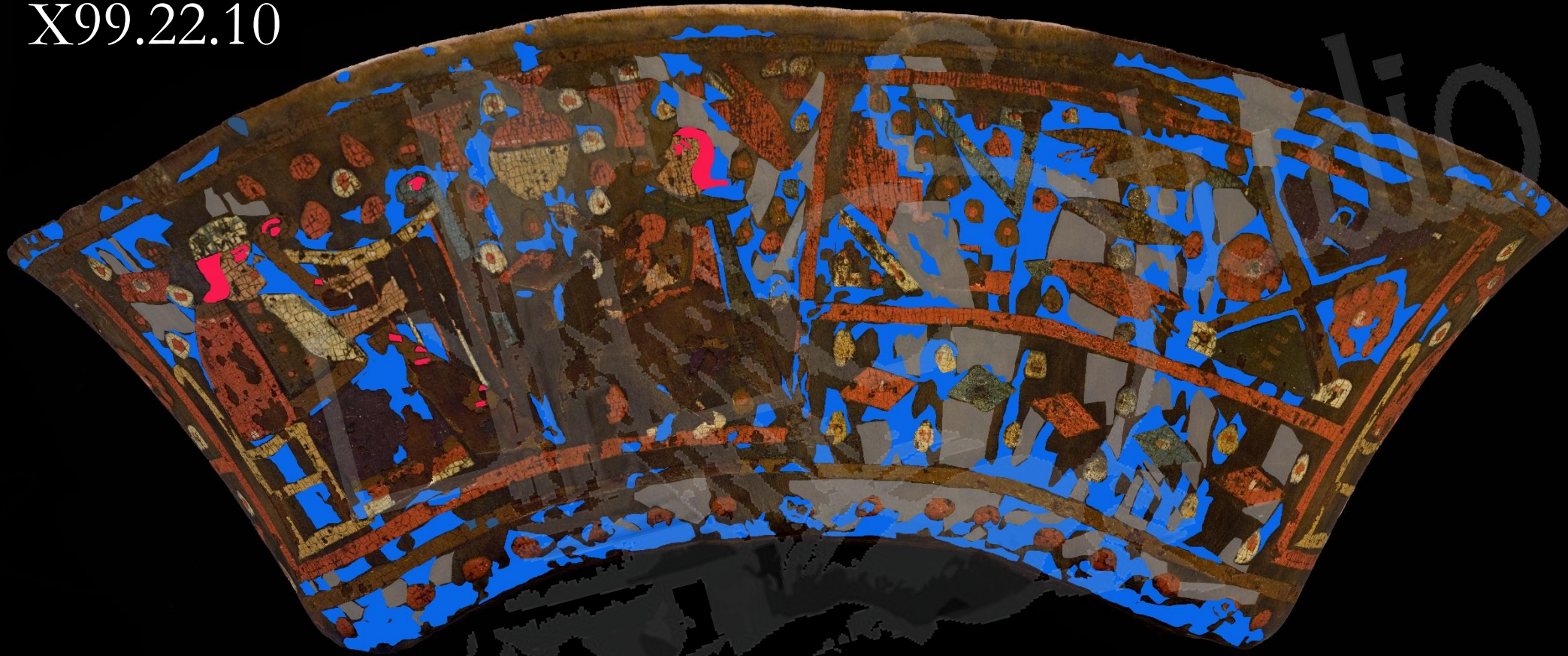
X99.22.5



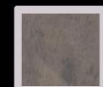


- Type #1
- Type #2
- Type #3
- Scraping

Scraping vs. Dark Material

X99.22.10



-  Type #1
-  Type #4
-  Scraping

Interpretation of Results

Identity of Dark Materials

Oils and Oil + Resin mixtures

Ethnographically used as inlay decoration

Ethnographic accretions from use

Applied oils before and/or after entering collections

Material associated with radial cracking

Absence of Dark Materials

Intentional scraping and sanding of surfaces to remove ethnographic accretions (sanding to even out the surface and reduce tool marks)

Abrasion associated with ethnographic repairs

Abrasion associated with ethnographic cleaning (?)



X99.22.1



X99.22.11

Interpretation of Results

Identity of Dark Materials

Oils and Oil + Resin mixtures

Ethnographically used as inlay decoration

Ethnographic accretions from use

Applied oils before and/or after entering collections

Material associated with radial cracking

Absence of Dark Materials

Intentional scraping and sanding of surfaces to remove ethnographic accretions (sanding to even out the surface and reduce tool marks)

Abrasion associated with ethnographic repairs

Abrasion associated with ethnographic cleaning (?)



X99.22.9

Interpretation of Results

Identity of Dark Materials

Oils and Oil + Resin mixtures

Ethnographically used as inlay decoration

Ethnographic accretions from use

Applied oils before and/or after entering collections

Material associated with radial cracking

Absence of Dark Materials

Intentional scraping and sanding of surfaces to remove ethnographic accretions (sanding to even out the surface and reduce tool marks)

Abrasion associated with ethnographic repairs

Abrasion associated with ethnographic cleaning (?)



X99.22.1



X99.22.3



X99.22.10



X99.22.11

Interpretation of Results

Identity of Dark Materials

Oils and Oil + Resin mixtures

Ethnographically used as inlay decoration

Ethnographic accretions from use

Applied oils before and/or after entering collections

Material associated with radial cracking

Absence of Dark Materials

Intentional scraping and sanding of surfaces to remove ethnographic accretions (sanding to even out the surface and reduce tool marks)

Abrasion associated with ethnographic repairs

Abrasion associated with ethnographic cleaning (?)



X99.22.5