Practical Care of Film and Glass Negatives

C2CC Webinar Series

Luisa Casella, Photograph Conservator
June 2024
Land Acknowledgement

Ithaca, NY is located on the traditional homelands of the Gayogohóꞌnǫꞌ (Cayuga Nation), who are part of the Haudenosaunee Confederacy.

The Confederacy is an alliance of six sovereign nations that predates the establishment of the United States.
C2CC Film and Glass Negative Related Programs

- The Preservation of Our Global Photographic Heritage: Here, There and Everywhere, by Debbie Norris
- Caring for Photographs, by Debbie Norris
- Caring for Audiovisual Materials Webinar 4: Introduction to Film Preservation, by Jeff Martin
- Identifying and Preserving Motion Picture Film, by Chris Austin
- A Discussion of Cold Storage Theory and Practice for Photographic and Paper-based Records, by Mark McCormick-Goodhart
Background
Background
What is a Negative?

Translucent support
Inverted image tones
Used as matrix to produce multiple positives
In-camera original
Support can be paper, glass or plastic
Many variants – we’ll focus on prevalent
Digital negatives – not covered today

Fernanda Valverde
Available at www.imagepermanenceinstitute.org
Louis-Jacques Mandé Daguerre, 1844
Daguerreotype
Jean-Baptiste Sabatier-Blot
George Eastman Museum

The Open Door, 1844
Salted paper print from paper negative
William Henry Fox Talbot
The Metropolitan Museum of Art
What is a Negative?

Haystack, ca.1852 Calotype
Salted paper print (above) and calotype (below)
William Henry Fox Talbot
National Media Museum

William Henry Fox Talbot, 1864
Carbon Print
John Moffat
George Eastman Museum

Haystack, ca.1852 Calotype
Salted paper print (above) and calotype (below)
William Henry Fox Talbot
National Media Museum
What is a Negative?

Sir John Herschel coined terms photography, positive and negative to refer to photographic images in 1839. He also found that hyposulphite of soda ("hypo") could be used as a photographic fixer.
What is a Negative?

Photographer Milton Kent in studio with enlarger, 1953.
Milton Kent Studio, from original negative.
State Library of New South Wales.

Printing out collodion negative onto gelatin silver paper.
Image: Mark Osterman

Photographer Milton Kent in studio with enlarger, 1953.
Milton Kent Studio, from original negative.
State Library of New South Wales.
What is a Negative?

- Light source
- Passes through negative
- Prints onto light-sensitive support

Negatives come in various supports, color and black and white
What is a Negative?

Basic Negative Cross-Section

Translucent support (paper, glass, plastic)
Image layer (binder + image forming materials)

Nitrate negative and corresponding silver gelatin print
What is a Negative?

Nitrate Negative Cross-Section

Support:
- cellulose nitrate
- cellulose acetate
- polyester

Image layer:
- Binder – collodion, gelatin
- Image forming material – silver, dyes
- Other layers – varnish, subbing, anti curl, anti halation

Nitrate negative and corresponding silver gelatin print
Timeline of Print Processes

- Salted paper: 1840-55
- Albumen: 1855-95
- Gelatin & collodion printed-out papers: 1895-1905
- "Black & white" developed-out papers: 1905-60
- Chromogenic color paper: 1960-2000
- Digital: 2000-present

Images: Debbie Hess Norris
Timeline of Common Use of Negative Processes

- 1841 - ca. 1865: Paper Negatives
- ca. 1878 - ca. 1915: Gelatin Dry Plates (Glass)
- ca. 1925 - ca. 2000: Cellulose Acetate Film Negatives
- 1851 - ca. 1885: Collodion Glass Plate Negatives
- ca. 1889 - ca. 1950: Cellulose Nitrate Film Negatives
- 1955 - ca. 2000: Polyester Film Negatives
Why do I need to know this?

To provide proper care for photographs you must know what they are.

Various types of negatives with various forms of deterioration
Paper Supported Negatives (1841 – ca.1865)

Rare
Handmade
Gentleman amateurs

Unknown photographer
Spreading Oak with Seated Figure, 1850s
Paper negative
The Metropolitan Museum of Art
Glass Supported Negatives (1851 – ca.1915)

Common

Wet–plate collodion

- 1851–ca.1885
- Hand coated by photographer

Dry plate (gelatin)

- 1878–ca.1815
- Industrially produced

Dry plates were commercially produced and more consistent and convenient.

France Scully coating collodion plate. Image: Mark Osterman
Glass Supported Negatives (1851 – ca.1915)

Common
Wet-plate collodion
- 1851–ca.1885
- Hand coated by photographer

Dry plate (gelatin)
- 1878–ca.1815
- Industrially produced

Photographer carrying wet-plate equipment
Image found at: https://www.pbs.org/

Positive/ negative view of collodion plate

Wet plate collodion tent
Image: Amazon.com
Glass Supported Negatives (1851 – ca.1915)

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- 1851–ca.1885
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Wet-plate collodion negative

Dry plate gelatin negative
Plastic Supported Negatives (after 1889)

Very common
Industrially produced
Cellulose Nitrate (ca.1889–ca.1950)
Cellulose Acetate (ca.1925–ca.2000)
Polyester (ca.1955–ca.2000)
Plastic Supported Negatives – Identification

Plates
- Edge printing
- Notch codes

Roll film
- Edge printing

Cross polarized filters

Odor

Color

Form of deterioration
Plastic Supported Negatives – Identification

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Form of deterioration

Cross-polarized filters - light passes through polyester
Plastic Supported Negatives – Identification

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Plastic Supported Negatives – Identification

Plates
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Cross polarized filters

Odor

Color

Form of deterioration

TCE flotation test - destructive

TOXIC!

Requires PPE and proper ventilation

Plastics Flotation Test

Acetate Floats

Polyester twirls in center

Nitrate sinks
Plastic Supported Negatives – Identification

Plates
- Edge printing
- Notch codes

Roll film
- Edge printing

Cross polarized filters

Odor

Color

Form of deterioration

Diphenylamine test - nitrate turns dark. **TOXIC! Requires PPE**

Image: Bertrand Lavédrine. “An easy-to-use procedure for identifying the cellulose nitrate base in photographic collections” YouTube video
Plastic Supported Negatives – Nitrate

- NFPA 40 – Standard for the Storage and Handling of Cellulose Nitrate Film
- Check local fire regulations
- Collections can be donated to institution with nitrate vault

Cleveland Clinic Fire
The New York Times
May 16, 1929
Plastic Supported Negatives – Identification

Edge printing
Notch codes
Cross polarized filters
Flotation Test
Burn test
Diphenylamine Test
Form of deterioration
Odor
Color

Characteristic deterioration of cellulose acetate supports - channelling and shrinking
Common Deterioration Issues
Common Deterioration Issues

- Physical Damage: Cracks, scratches, and breaks.
- Chemical Degradation: Vinegar syndrome (acetate film deterioration), silver mirroring of image layer, glass deterioration.
- Environmental Damage: Effects of humidity, temperature fluctuations, and light exposure.
Common Deterioration Issues

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*Broken glass support Hessler negative and interpositive before treatment at George Eastman House in 2005.*
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Silver mirroring formed in exposed area
Common Deterioration Issues

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- Chemical Degradation: Vinegar syndrome (acetate film deterioration), silver mirroring of image layer, glass deterioration.
- Environmental Damage: Effects of humidity, temperature fluctuations, and light exposure.

Silver mirroring formed around print border
Common Deterioration Issues

- Physical Damage: Cracks, scratches, and breaks.
- Chemical Degradation: Vinegar syndrome (acetate film deterioration), silver mirroring of image layer, glass deterioration.
- Environmental Damage: Effects of humidity, temperature fluctuations, and light exposure.

Severe delamination of glass plate negatives and original box.
Preventive Measures
Preventive Measures

- **Survey**
  - Identify
  - Isolate active damage
  - Take stock
- **Make a plan**
- **Catalog**
- **Assess and improve conditions**
  - Environment
  - Storage (boxes, shelves)
  - Individual housing
- **Maintain**
Preventive Measures – Survey

- Contact conservator/ Apply for CAP Grant
- Survey collection efficiently in under a week
- Use AD Strips to determine decay
- Install inexpensive dataloggers
- Install pest traps for monitoring
- Check for possible risks (broken windows, leaks, frass, mold, odors)
- Wear PPE

PPE encouraged during survey (gloves, labcoat, respirator) as there is risk of mold, fumes and other contaminant harmful to human health.
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Surveys can be overwhelming but there are small steps you can take and supporting resources.
Preventive Measures – Survey

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Preventive Measures – Survey

Remember: Survey Data help you prioritize, plan and supports funding applications!

GET ALL THE DATA YOU CAN

WE'LL THINK OF A USE FOR IT LATER
Preventive Measures – Planning

- Define goals and resources
- Emergency Plan
- Allied institutions (funders, communities, resources)
- Cleaning, rehousing
- Cataloguing
- Environmental changes
- Grant application
- Staff capacity and training
- Long term maintenance

Conservator Élia Roldão and Alberto Cruz cataloguing collection
Preventive Measures – Funding

- Look for funding sources
  - AIC resources
  - Candid
  - Local grant resources

https://candid.org/
### Preventive Measures – Funding

- Look for funding sources
  - AIC resources
  - Candid
  - Local grant resources

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**NYSCA/GHHN PRESERVATION SUPPLIES GRANT**

**APPLICATION PORTAL OPENS: MAY 1, 2024**

**APPLICATION PORTAL CLOSES: MAY 31, 2024**

<table>
<thead>
<tr>
<th>GUIDELINES</th>
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<tbody>
<tr>
<td>The NYSCA/GHHN PRESERVATION SUPPLIES GRANT is an opportunity under the NYSCA/GHHN Conservation Grant Program partnership between the New York State Council on the Arts (NYSCA) and Greater Hudson Heritage Network (GHHN) that provides funds to purchase collection management supplies for museums, historical, and cultural organizations in New York State. Additional funding from the Robert David Lion Gardiner Foundation supports projects from Long Island and New York City.</td>
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<th>BUDGET</th>
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<td>Applications will be accepted from chartered nonprofit museums, historical organizations or other cultural institutions either incorporated in or registered to do business in NYS, that own, care for and exhibit collections to the public. GHHN membership is not required. Federal &amp; municipal museums and historic sites must contact the GHHN to discuss eligibility. Sites owned by state agencies and religious institutions are ineligible. Organizations with budgets under $250,000 are strongly encouraged to apply. Organizations may apply once a year.</td>
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<th>FINAL REPORT</th>
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<th>APPLY NOW!</th>
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Greater Hudson Heritage Network [https://www.greaterhudson.org/](https://www.greaterhudson.org/) offers yearly conservation and preservation supplies grants to NY State institutions.
Preventive Measures – Catalog

- Review existing organization
- Determine
  - Scope
  - Use of collection
  - Resources

Vera Sardinha cataloguing collection. Cataloguing the collection involves identification, numbering and description. Can be as simple as a paper form.
Preventive Measures – Conditions

- Assess and improve conditions
  - Environment
  - Storage (boxes, shelves)
  - Individual housing
  - Infestations (mold, etc)
  - Item deterioration (acetate deterioration, nitrate presence, color fading, broken supports)

Joana Duarte recording HR. Monitoring and recording conditions is essential for understanding collection behavior.
Preventive Measures – Environment
Preventive Measures – Environment

- Temperature – 70°F or below
  - Do not freeze glass supports
- RH – 30% and 50%, fluctuations under 10% per day
- High RH and high Temp accelerates deterioration mechanisms and promotes biological growth

*Handheld thermo hygrometer*
Preventive Measures – Environment

- Budget
- Crucial conditions to improve
- Low hanging fruit
  - Close doors
  - Blinds
  - Find best space in building
  - Organization
- Equipment
  - HVAC
  - Standalone humidifier/dehumidifier; AC
  - Data Logger
  - Ventilation/Fan

Low-hanging fruit: organize drawers; remove metal clips
Preventive Measures – Environment

- **Budget**
  - Grants
  - Local resources
  - Free/low cost resources

- **Monitoring**
  - Paid services (e.g. Conserv, HOBO)
  - Inexpensive options work too!

- **Color materials**
  - Cold storage?

*Inexpensive wireless GoVee datalogger*
Preventive Measures – Environment

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National Park Service Cold Storage website
Preventive Measures – Environment

- **Budget**
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Preventive Measures – Storage

- Shelves, furniture
  - Avoid wood
    - Interleaving layers
  - Powder coated metal best
  - Look for signs of rust
  - Ventilation is important
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Preventive Measures – Storage

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  - Avoid wood
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  - Look for signs of rust
  - Ventilation is important

An extreme example of rusted metal shelves due to ceiling leak
Preventive Measures – Housing

- Group and Individual housing
  - Adapt to use (e.g. binders)
- Use PAT tested materials
- Don’t blindly trust the notice “archival” or “acid-free”
- Check archival products websites
- Look for grants
- Don’t overstuff boxes or binders – set a limit (also consider weight)

Although negatives are housed in 4-flap envelopes, the pressure of the excessive number of plates is posing risk of damage.
Preventive Measures – Housing

- Group and Individual housing
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- Use PAT tested materials
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The excessive number of items in this box is posing risk of damage
Preventive Measures – Housing

- Group and Individual housing
  - Adapt to use (e.g. binders)
- Use PAT tested materials
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Housing design should not only fit type of material but also intended use.
Preventive Measures – Maintenance

- How do you plan to maintain measures over time?
  - Budget
  - Staff capacity
  - Infrastructure
  - Use

Élia Roldão holding oversized X-Ray film. Infrastructure required for different sizes will vary.
Conservation Treatment
Conservation Treatment

- When to call a conservator
- What can be done
- What can’t be done

Staff can be trained to do tasks such as surface cleaning
Conservation Treatment – What can be done

- Good practices
  - Proper handling
  - Work in clean uncluttered area
  - Clean dry hands or nitrile gloves
  - PPE if needed

- Some original housing can be fine
  - Not everything needs replacing

Some original housing, such as this, do not pose any immediate risk to the collection and can be maintained.
Conservation Treatment – What can be done

- **Staff can train to do**
  - Surface cleaning
  - Stabilization of glass supports
  - Housing
  - Digitization

*Staff can do systematic rehousing*
Conservation Treatment – what is not damage

- Masks
- Retouching

Masks were used as applied media to negatives. They are original and should not be removed.
Conservation Treatment – what is not damage

- Masks
- Retouching

Masks were used as applied media to negatives such as this density mask. They are original and should not be removed.
Conservation Treatment – what is not damage

- Masks
- Retouching

*Wet plate collodion negative retouching with graphite.*
*Images: Mark Osterman*
Conservation Treatment – What can be done

- Professional conservator
  - Consolidation
  - Emulsion stripping
  - Chemical treatments

Find a conservator by specialty and region at www.culturalheritage.org
Conservation Treatment – What can be done

- Professional conservator
  - Consolidation
  - Emulsion stripping
  - Chemical treatments

Broken glass supports can be stabilized
Conservation Treatment – What can be done

- Professional conservator
  - Consolidation
  - Emulsion stripping
  - Chemical treatments

Emulsion stripping of deteriorated acetate negatives can be done by a professional conservator.

Image: Marie-Lou Beauchamp, Canadian Conservation Institute
Conservation Treatment – What can be done

- Professional conservator
  - Consolidation
  - Emulsion stripping
  - Chemical treatments

Some intensification of image chemical treatments can be done by a professional conservator when justified.
Conservation Treatment – What can be done

- Professional services
  - Duplication
  - Mold remediation
  - Biological infestation

Specialized companies such as Chicago Albumen Works can do mass duplication of negatives.
Conservation Treatment – What can’t be done

- Reverse
  - Losses
  - Breakage
  - Most discoloration
  - Staining

- Extensive image loss
- Severe deterioration of nitrate cellulose negative
Disaster Response

- Certain materials likely lost
- Plastic supports – rinse and air dry
- Freeze if not addressed under 48 hours
- Have emergency plan
- AIC Emergency Support Network

Delamination of glass plate negative caused by extensive water immersion

Water damaged collodion binder
Disaster Response

- Certain materials likely lost
- Plastic supports – rinse and air dry
- Freeze if not addressed under 48 hours
- Have emergency plan
- AIC Emergency Support Network

Anti halation layer dyes reformed

Rinse and air drying materials immediately is ideal
Summary and Key Takeaways

- Identification is key
- Know what you have
- Make a plan
- Start with achievable goals
- Small changes can have great impact
  - Cleaning
  - Organization
  - Monitoring
- Low temp and dry environment 30% to 50% RH and under 70F preferred
- You are not alone! Reach out!

IPCR negatives rehousing project. Left: before treatment. Right: Élia Roldão in clean vault, after treatment
Luisa Casella
MAC, Fellow of AIC
luisa.casella@gmail.com
www.luisacasella.com

Acknowledgements: Jae Gutierrez, Marie-Lou Beauchamp, Mark Osterman