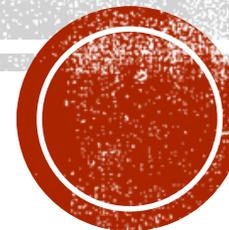


# CARING FOR PHOTOGRAPH COLLECTIONS



**Karen Keehr**  
Photograph Curator  
Nebraska State Historical Society

# RELATIVE HUMIDITY (RH)

- The amount of water in the air
- Single most important environmental factor
- **Ideal RH in an Archive: 40%**
- High levels (50%-100%) cause oxidation, fading, and spread of fungus
- Low levels (0-30%) can cause photos to become brittle and shrink unevenly
- Important to avoid extreme fluctuations



# TEMPERATURE

- Deterioration is the chemical breakdown of the photograph
  - Heat increases chemical reactions
- Ideal temperature for Archives: 60-65°F
  - Anything below 65°F, no longer comfortable for people to work for long periods of time
  - Keep as low as possible without raising RH and causing condensation when moved to warmer environment
- Consider **cold storage** for:
  - Nitrate negatives
  - Acetate negatives
  - Color negatives
  - Color prints



# TEMPERATURE & HUMIDITY

- Keys to preservation
- Interrelated
- Temperature determines water air can hold
  - Warm air holds more water then cold air
- In a closed system like a room or building:
  - A rise in temperature will lower the RH
  - Cooling the air will drive up the RH
- Combination of high temperatures and high RH is one of the **worst** things to happen to your collection
  - Can cause emulsion to become sticky



# LIGHT

- Just plain BAD!
- Causes fading and yellowing
- Damage caused by light permanent
- Ultraviolet (UV) light causes the most damage
  - Protection from UV light does NOT eliminate light damage.
  - ALL light is bad
- Some types of images are particularly light sensitive
  - Albumen prints, cyanotypes, and especially **color** images



# WHAT TO DO:



- Display copies whenever possible
- Scanning or photocopying cause little harm
  - Continued light exposure & handling cause much more damage
  - Keep scanning and copying to a minimum
- Keep original photographs in the dark
- If you do display an original
  - Know that the damage is permanent
  - Take precautions
    - Avoid direct sunlight
    - Choose glass with UV protection
    - Select Archival quality frame and mats
  - Monitor fading



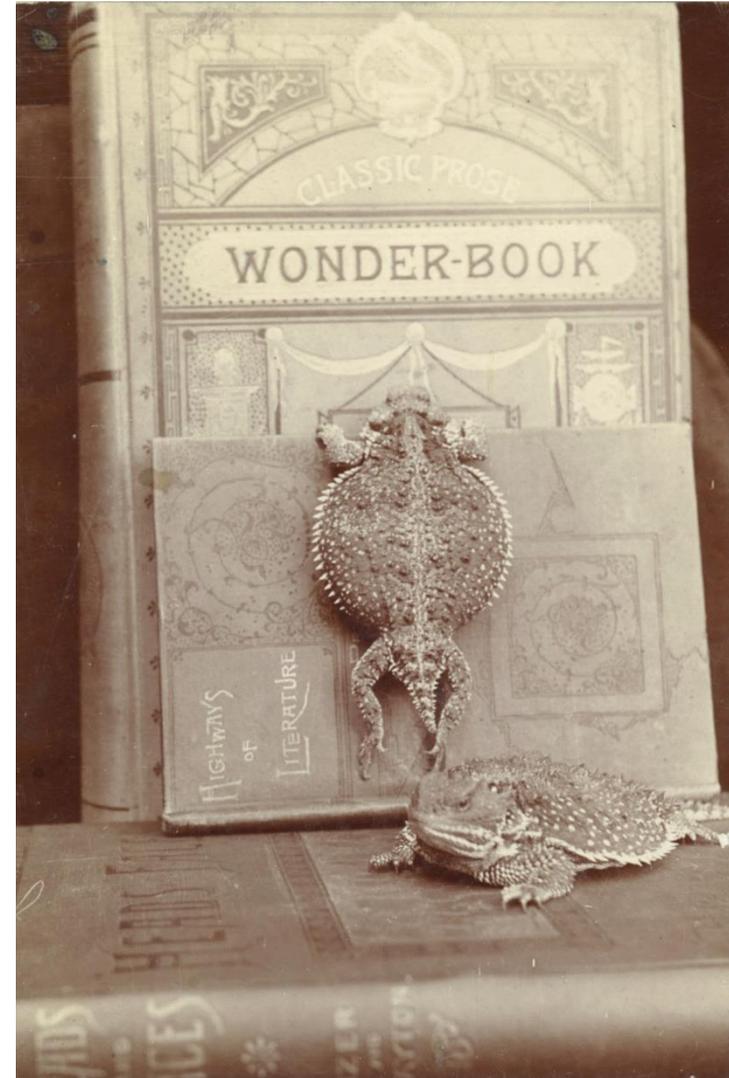
# TYPES OF PESTS TO WATCH FOR

- Often the result of poor storage conditions
- Things that will eat your collection
  - Rodents
  - Mold
  - Insects: Silverfish, firebrats, German cockroaches, furniture beetles, termites
- Things that leave behind messes
  - Rodents
  - Mold
  - Insects: Cockroaches, flies, spiders, wasps, etc.



# WHAT TO DO:

- Create an Integrated Pest Management Policy (IPM)
- Prevention is the best protection
  - Improve your storage conditions
    - Door sweeps
    - Plug holes
  - Monitor your collection
- If you think you have a problem
  - Handle with care and protect yourself
  - Use **sticky traps** to identify species
  - Contact an expert
    - Gerald R. Ford Conservation Center (Omaha, NE)



# STORAGE OF PHOTOGRAPHS

- Store in proper photograph storage
  - Provide support and protection
  - Improve organization
  - Aid in disaster recovery
- Use only materials that have passed the **Photographic Activity Test (PAT)**
  - Meet or exceed national standards
  - Will not harm your photographs
  - **Not the same as “Archival”**
- Acid-free, lignin-free, unbuffered
- **Choose the size closest to what you are storing**
  - Not too tight: could be damaged when removed
  - Not too loose: slide around & damage corners



# PAPER VS. PLASTIC

- Plastic over Paper for:
  - Damaged, weak, or brittle photographs
  - Thin prints
  - Often handled or looked at images
- Paper over Plastic for
  - Nitrate or acetate negatives to allow off-gassing
  - Poorly processed prints



# PAPER HOUSING MATERIALS

- Chemically stable
- Specific pH level
  - Unbuffered usually recommended for all photos
- Smooth, non-abrasive
- Pass PAT test
- **NO glassine or magnetic albums**
  - Remove immediately



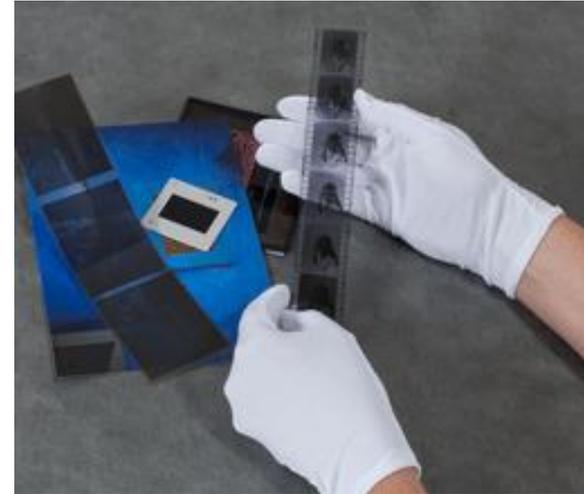
# PLASTIC HOUSING MATERIALS

- Chemically inert
  - Will not react with photographs
- No surface coatings
- Passes the PAT test
- Main types
  - Polyester
  - Polypropylene
  - Polyethylene



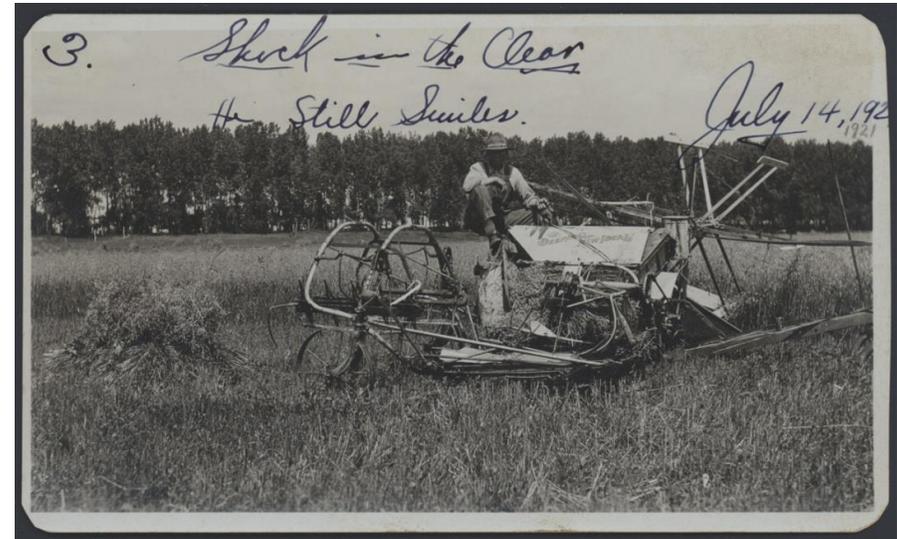
# HOW TO HANDLE PHOTOGRAPHS

- Wear white cotton or latex/nitrile gloves
- Use both hands
- Never pick up or hold photographs by corners
- Support image if you turn it over
- Use paper or mat board to add support for fragile items



# LABELING PHOTOGRAPHS

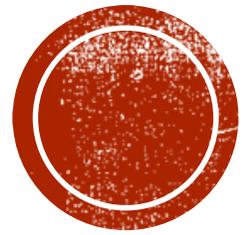
- Write along the edge on the back of the photo
  - Never write on front
- Do not press too hard
- **Use pencil**
  - Good old No. 2
  - General's Woodless Graphite pencil
    - Writes even on modern, coated photographs
- Pens can bleed through paper and smear
  - Especially during a disaster
- Consider writing on enclosure or photocopy rather than original photograph



# CLEANING AND REPAIR

- **Do not** attempt to clean or repair heirloom photographs yourself or allow anyone (even commercial photographers) not trained in photographic conservation to “restore” your photographs
  - Consult a professional conservator
- Use a soft brush to gently remove dust particles
  - Photograph brush
  - Natural makeup brushes



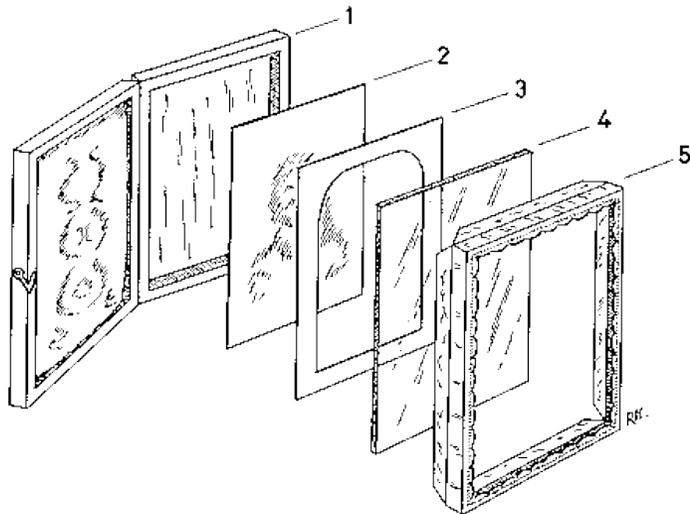


# TYPES OF PHOTOGRAPHS



# DAGUERRETYPE

- 1839-1860s, “Mirror with Memory”
- Highly reflective surface
- Image appears positive only under certain lighting conditions & angles of view
- Surface very soft, easily damaged
  - Always found in a **Case**



# DAGUERRETYPE CARE & STORAGE

- Deterioration is caused by pollutants and humid storage environments
- Never touch the surface
- Never take apart yourself, contact a conservator
- If seal is broken, silver will tarnish
  - Appears as a colored haze (yellow, magenta, or blue)
  - Contact a photograph conservator
  - Attempts to reseal can cause further damage



# DAGUERRETYPE CARE & STORAGE

- Store in cool, dry environment
- Construct individual, customized boxes for storage
  - Protect against environmental changes & pollutants
  - See handout
- Avoid overly intense light sources if displayed
- Original glass covers also deteriorate
  - “Weeping glass”
  - Tiny whitish spots on the interior side of the glass
  - Contact a conservator

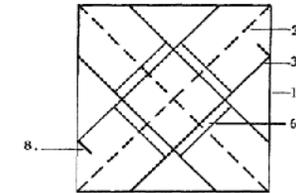
Taken from website: <http://cool.conservation-us.org/coolaic/sg/bpp/annual/v02/bp02-08.html>  
*The Book and Paper Group Annual, Volume Two, 1983. "The Proper Storage and Display of a Photographic Collection," by Debbie Hess Norris. (A paper presented to the Washington Conservation Guild, March 1983.)*

## Procedure for Making Protective Boxes to House Cased Objects (Daguerreotypes, Ambrotypes, and Tintypes)

*Credit for this design to go to Chris King and Ellen Tenentes*

For non-standard size cases the jackets must be custom made to fit.

1. Cut a square of acid-free board (.010 - .020" thick) whose sides are about 2-1/4 times longer than the largest dimension of the miniature case.



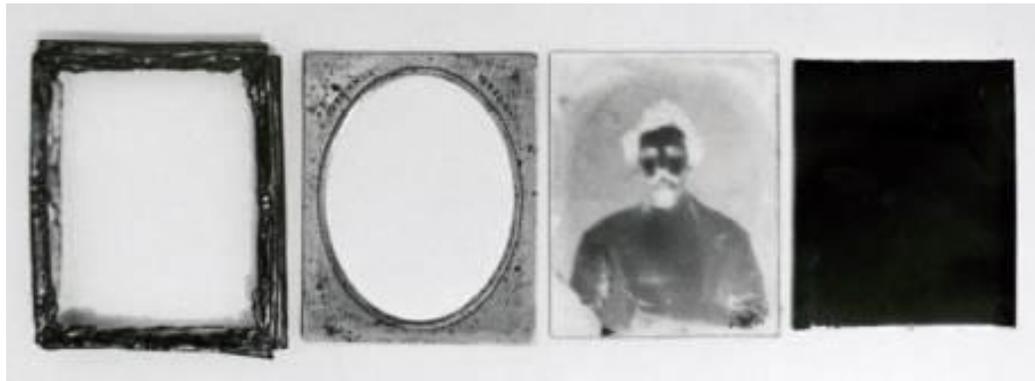
2. Mark the center of the board by drawing the diagonals of the square. Place the case diagonally at the center. Mark the corners of the case and then set the case aside.
3. Connect the marked corners using a straightedge and a No.2 pencil - continue these lines out to the edge of the acid-free board.
4. Cut the triangles out of the edges.
5. With a utility knife score the inner rectangle.
6. Measure the depth of the case. Mark this distance on each "arm" of the acid-free board, measuring out from the inner rectangle. Score a line at this position on each arm.
7. Fold the jacket along the scored lines. Place the case in the jacket and check for fit, adjusting as necessary.
8. Cut the notch and slit which represent the clasp at a convenient location - the case should be made to fit snugly but not tightly.

Most cases were mass produced and consequently are of standard sizes. Templates may be easily made.



# AMBROTYPE

- One-of-a-kind
- Patented in U.S. by James Ambrose Cutting, 1854
- Thin collodion negative on glass
  - Appear positive by placing a black background behind it.
- Usually found in a case



# AMBROTYPE CARE & STORAGE

- Damage often due to the deterioration of the dark backing
  - Destroys the positive/negative effect
  - Unlike Daguerreotypes, can be carefully taken apart & backing replaced
  - Consult a conservator
- Store in a cool, dry place
- Like Daguerreotypes, custom storage boxes recommended



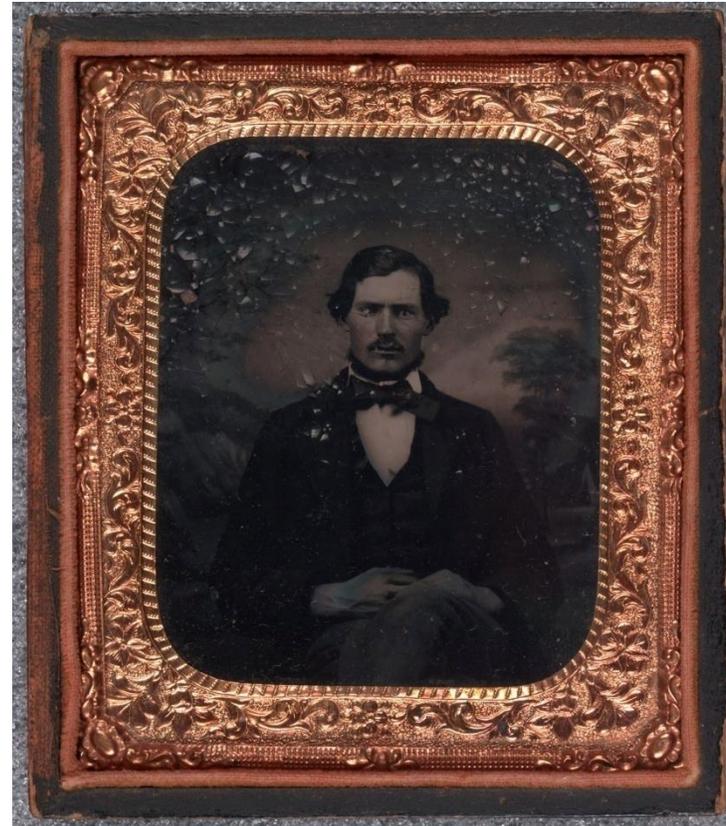
# TINTYPES

- Patented by Hamilton Smith in 1856.
- Also known as **ferrotype** (proper name since there is no tin) or **melainotype**
- Negative is supported by dark lacquered thin iron sheet
  - Similar to Ambrotypes, but support is different
- Wouldn't shatter as a glass image
  - Popularity grew during Civil War
  - Tintypes could be mailed without shattering
- While considered functionally dead after 1900, examples found dating as late as 1930.



# IDENTIFYING TINTYPES

- In a case, difficult to tell from Ambrotypes
  - If a magnet does **not** hold, it is an Ambrotype
  - If a magnet holds, it is likely a tintype
    - Darkly varnished metal backings were sometimes used for Ambrotypes.
- Deterioration often offers best clues
  - Easily bent, which can cause the varnish to crack.
  - Once air & moisture penetrates iron support, it begins to rust.



# TINTYPE CARE & STORAGE

- Because tintypes were meant to be handled, surface often scratched or bent
  - Even the slightest humidity will cause rust to appear
- Sometimes surface was varnished
  - Varnish can yellow when exposed to strong light
- Keep in storage envelopes
  - 4-flap enclosures
    - Especially for flaking emulsion
  - Protect against light and humidity
  - To prevent bending, add a piece of archival cardboard for more support



# COLLODION WET PLATE NEGATIVES

- Used from 1851-1885
- Collodion: Cellulose nitrate dissolved in ether & alcohol
- Applied to glass to provide binder for photosensitive silver compounds
- Plate coated by hand & placed into camera wet
- Often identified by uneven emulsion coating
  - Tidal waves
  - Corners and edges uncoated



# COLLODION PLATE CARE & STORAGE

- Because emulsion was soft, usually varnished
  - Helped protect against humidity and pollutants
  - Easily scratched or abraded
- Supported on glass, vulnerable to breakage
- Store in envelopes in correctly sized boxes
  - Paper enclosures add protection against changes in humidity and pollutants
- Store vertically along long edge
  - Horizontal or flat storage not recommended



# GLASS PLATE RECOMMENDED STORAGE

## 4-flap negative enclosures

- Acid-free, lignin-free, unbuffered, PAT approved
- Reduces abrasions



## Glass plate negative boxes

- Acid-free, lignin-free, unbuffered, PAT approved
- Rigid dividers to keep plates vertical & reduce pressure



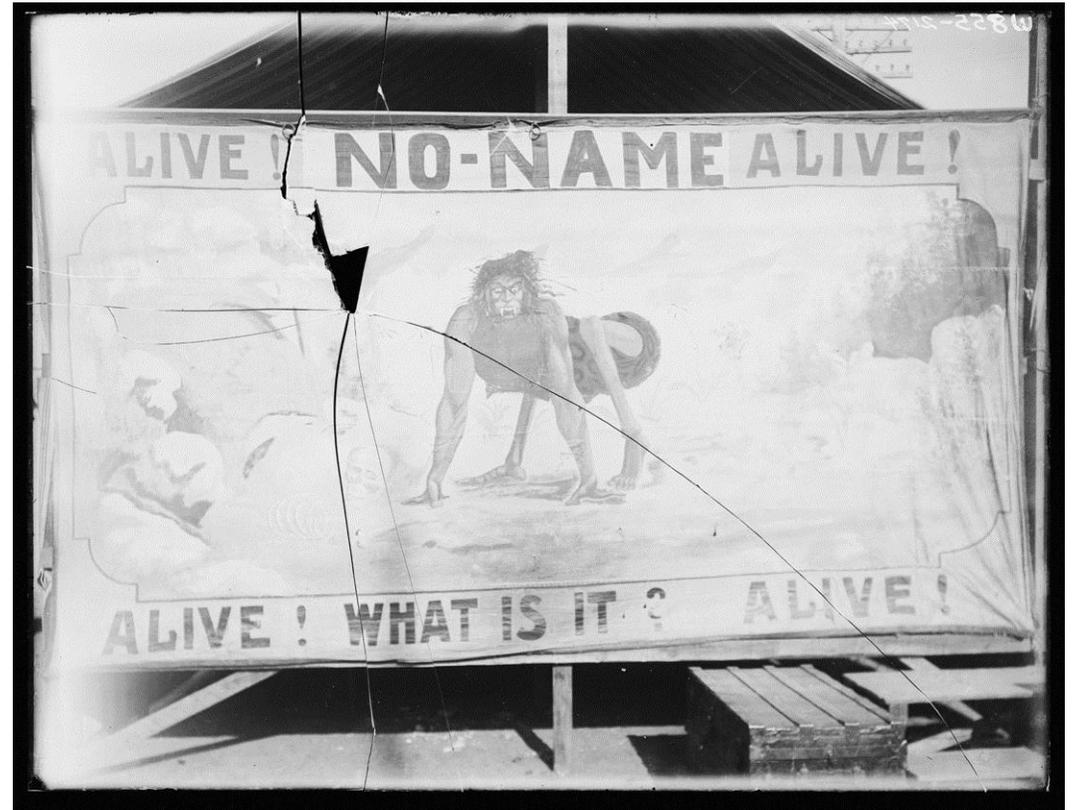
# GELATIN DRY PLATES

- Popular from 1878-1940
- Unlike Collodion , Gelatin negatives were “dry”
  - Retained their sensitivity for months before use
  - Could be developed long after exposure
- Could be manufactured industrially, stored, distributed throughout the world, and purchased for future use
  - Photography no longer exclusive to professionals with darkrooms
  - Very common in collections



# DETERIORATION PROBLEMS

- Physical damage: breaks and cracks
- Delamination: emulsion lifting from glass
  - Poor preparation of glass
  - Glass deterioration
  - Exposure to extremely high humidity
- All gelatin photographs (negatives & prints) subject to oxidation
  - Manifests as fading, yellowing, and silver mirroring



# GELATIN PLATE CARE & STORAGE

- Supported on glass, vulnerable to breakage
- Choose environment that is cool and dry
- Store in envelopes in correctly sized boxes
  - Paper enclosures add protection against changes in humidity and pollutants
  - Store vertically along long edge
- Store vertically along long edge
  - Horizontal or flat storage not recommended



# CELLULOSE NITRATE NEGATIVES

- Commonly used from 1910-1939
  - Manufactured from 1888-1951
- Used for sheet film and motion picture film
- Usually have “NITRATE” marked on edge
- Very flammable
  - Can burn under water
  - Once ignited, nitrate fires are almost impossible to put out
  - Toxic gases produced by burning nitrates are lethal
- Inherently unstable



# PROBLEMS WITH NITRATE

- Unless kept at very low temperature, cellulose nitrate self-destructs at unpredictable rates
- As it deteriorates, gives off acidic by-products (nitric oxide, nitrogen dioxide)
  - These gases are deep lung irritants
  - Repeated exposure may cause eye irritation, rashes, & sores on face & neck, vertigo, nausea, headaches, swollen glands, & respiratory irritations
  - Also cause damage to materials around it
    - Embrittlement of paper & film and cumulative damage to many organic materials & metals



# WHAT TO DO WITH NITRATE FILM

- Store separately from other photographic material
  - Well-ventilated
- Maintain a stable environment
  - Deterioration highly dependent on temperature & relative humidity
  - 32-40°F with relative humidity of 20-30%
- Best method is to store in a freezer
  - Slows decomposition (does not stop)
  - Special archival cold storage materials required
- Use 3 layers of protection
  - Individual sleeves
  - Archival, acid-free box
  - Place box in freezer or on shelf
- Never seal nitrate film in airtight containers
  - Gases and heat created must be allowed to escape



# CELLULOSE ACETATE FILM

- 1925-present
  - Slowly replaced nitrate film
- Cellulose acetate, diacetate, triacetate, etc.
- “SAFETY” marked on edge
  - Burns with difficulty
- Stability problems
  - Autocatalytic: once deterioration has begun, the degradation produces further damage
  - Plastic supports become acidic, shrink and give off a strong vinegar (acetic acid) smell



# VINEGAR SYNDROME IN ACETATE FILM

- When stored in poor environment (high temperature & relative humidity) or exposed to acidic vapors
  - Undergoes chemical reaction to form acetic acid
- Causes support to become acidic, brittle, and shrink
- Six progressive stages
  1. No deterioration.
  2. The negatives begin to curl and they can turn red or blue.
  3. The onset of acetic acid (vinegar smell); also shrinkage and brittleness.
  4. The warping can begin.
  5. The formation of bubbles and crystals in the film.
  6. The formation of channeling in the film.
- **Cold Storage recommended**



# POLYESTER FILM

- 1965-present
- When viewed between polarizing filters, the film is identified by interference patterns (rainbow colors)
- Much more stable over time than nitrate or acetate film



# ALBUMEN PRINTS

- Often sepia toned with a slightly glossy surface
  - Unfaded albumen prints have a purple-brown tone, rather than sepia
- No baryta layer
  - Prints are always mounted
  - Paper fibers visible through albumen
- Signs of deterioration can be helpful in identifying albumen prints
  - Yellowing
  - Localized or overall image fading



# COLLODION PRINTS

- Made with the same sticky **nitrocellulose** emulsion as Ambrotypes and wet plate negatives
  - Mixed with **silver chloride** and coated onto paper.
- Surfaces can be matte, glossy, or semi-gloss, like an albumen print
- The white areas generally lack yellowish cast of albumen prints
- Usually toned with gold or platinum
  - Show little or no fading
- They do not show silver mirroring



# SILVER GELATIN PRINT

## Printed Out Process

- Image developed from direct reaction to light
- Warmer in tone
- Usually very glossy
- Often faded to yellow
- First appeared in late 1880s

## Developed Out Process

- Visible image through use of chemical developer
- Cooler in color (blue, neutral, or black) unless toned
- Made either by contact printing or enlarged from negative



# CYANOTYPE CARE & IDENTIFICATION

- Based on light sensitivity of iron salts
  - Ferric ferrocyanide (Prussian Blue)
  - Ferrous ferricyanide (Turnbull's Blue)
- Easily identified by uniform, bright blue color
- Exposure to light chemically changes image to a colorless form
  - To some extent the change reverses itself in the dark & the blue color is restored
- Images subject to alkaline conditions fade to very pale brown & lose almost all detail and density
- Store in unbuffered or plastic enclosures



# IDENTIFICATION OF PLATINOTYPES

- In platinotypes, or platinum prints, paper is sensitized with platinum salts
- Image appears embedded in the paper fibers
- Highly stable metallic platinum
  - Resistant to fading
- Toning is generally silver to black, but warm browns were also achieved
- “Ghost” prints
  - If poor quality paper is left in contact with platinum print, platinum will accelerate cellulose degradation
    - Brownish discoloration on paper
    - Not a transfer print



# COLOR NEGATIVE

- 3 gelatin image layers, laid one on top of the other
  - Top to bottom, yellow, magenta, & cyan
  - Modern films have more complex layered structure
- Chromogenic process
  - Dye molecules are synthesized during processing
    - Chromo = Color
    - -genic = producing
- Cold Storage recommended



# COLOR PRINTS

- Image consists of at least 3 separate gelatin layers, laid one on top of the other
  - Top to bottom: cyan, magenta, yellow
- Images aren't **“Turning Yellow”**
  - The **magenta** and **cyan** layers fade faster than the yellow layer
- Chromogenic process
- Modern color prints have resin coated backing
  - What makes it difficult to write on backs of photos
- Cold Storage recommended



# ALBUMS AND SCRAPBOOKS

- Present unique challenges
  - Often feature mixed media
- Big questions: Take apart or leave as is?
  - Depends on the condition
  - Evaluate the condition of the photographs, pages and album
- “Visual Diaries”
  - Created to tell a story



# ALBUMS & SCRAPBOOKS

- If photos appear in good condition, leave together
- Interleave pages with acid-free tissue paper
  - Tissue paper will absorb acids in album pages, so monitor and replace regularly
- Cabinet card albums often have gilded edges
  - Can cause gold/white spots in emulsion
  - Interleave with tissue or Mylar



# TAKING APART ALBUMS

- Often the last resort
- Always remove photos from magnetic page albums
- Consider photocopying or scanning first
  - Part of the documentation
  - Helps preserve the “story”
- Document everything
  - Condition
  - Why it was taking apart
  - Which photos went on which pages, etc.



# ROLLED PHOTOGRAPHS

- A Four-Step Procedure for Flattening a Rolled-Up Paper Document or Photograph
  - Do not use with oil paints, watercolors, charcoal, chalks or pastels
  - See NPS Conserve O Gram 13.2
- Step 1: Clean the Paper
- Step 2: Assemble a Humidification Chamber
- Step 3: Humidify the Paper
- Step 4: Flatten the Paper
  - Emulsion will be soft, do not place anything directly on top
  - Place weights around edges

