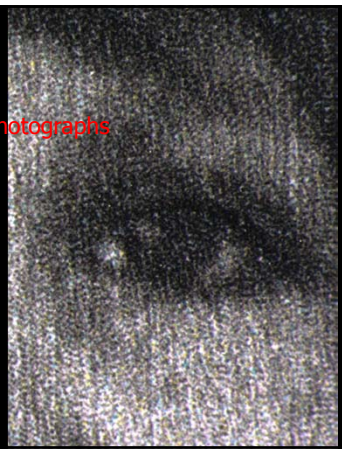
Preservation of Photographic Collections

Preservation of Photographic Materials

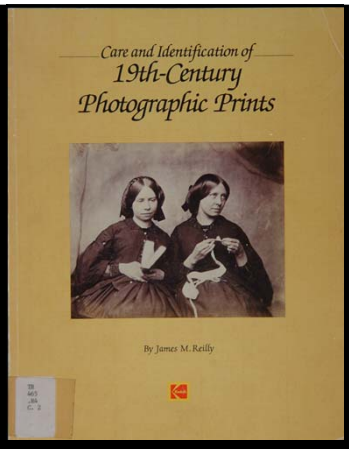
Identification of Photographs

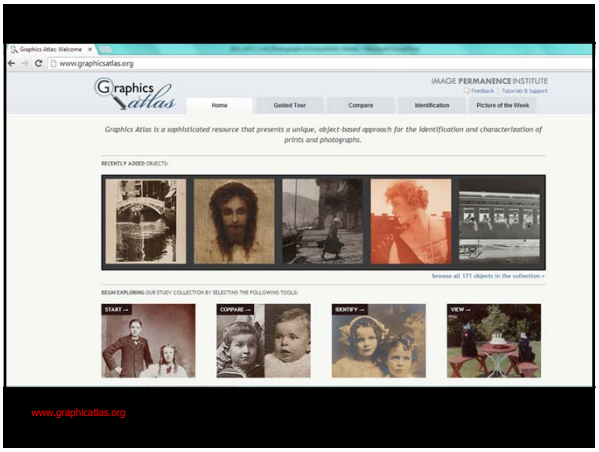


Monique C. Fischer
Senior Photograph Conservator

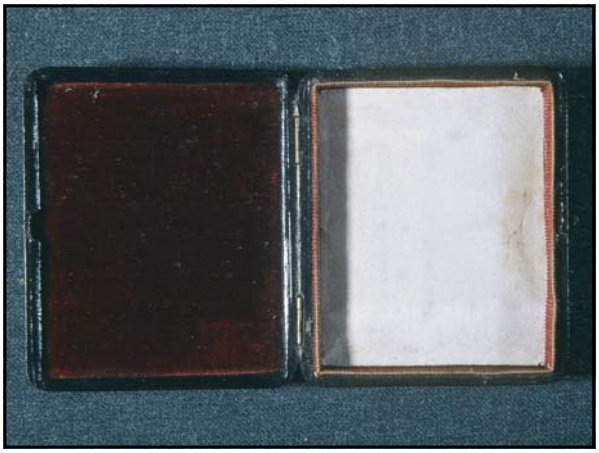
Broad Categories

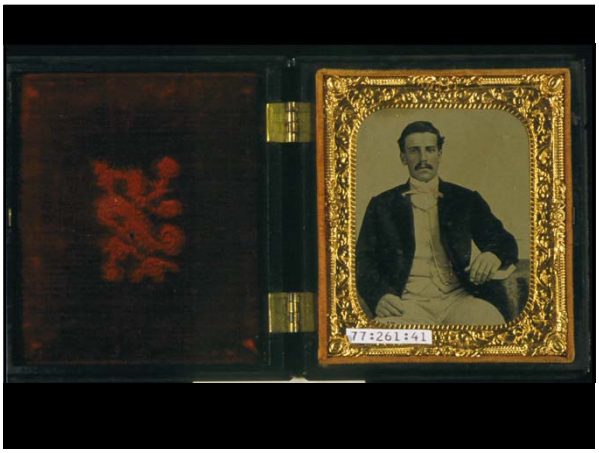
- 19th century
- Early 20th century
- Photomechanical processes
- Color materials
- Digital output media





www.graphicatlas.org

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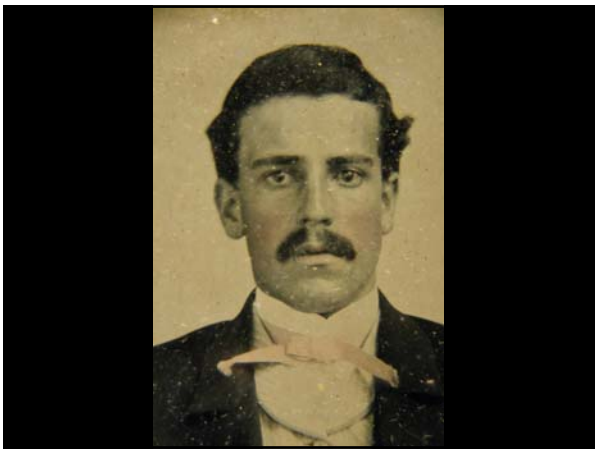
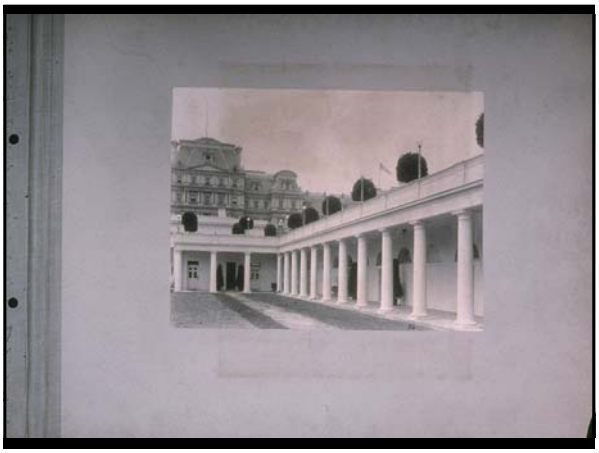


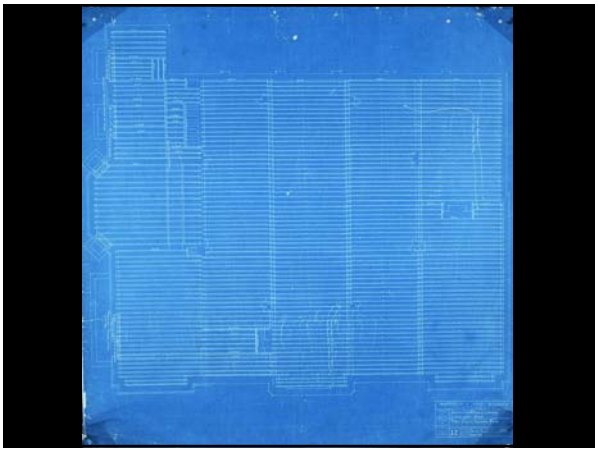
Layers

- Support: paper, glass, metal
- Binder: albumen, collodion, gelatin
- Final Image Material: light sensitive materials

One Layer Structures

- Final image material embedded in paper support
- Paper fibers visible under magnification
- Matte surface
- Salted paper prints, cyanotypes and platinum prints





Two Layer Structures

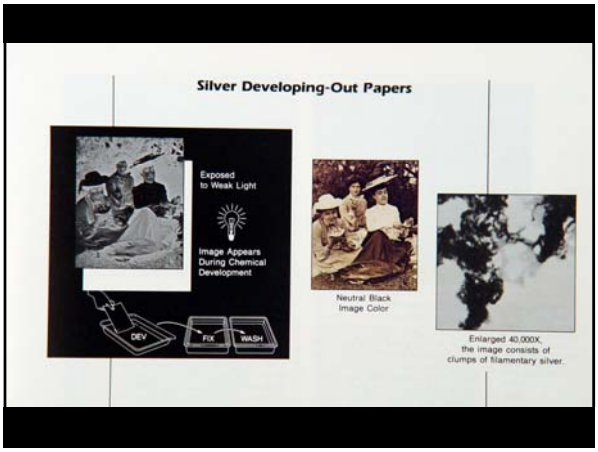
- Binder layer is present
- No baryta layer
- Paper fibers visible through binder
- Semi-gloss
- Albumen and carbon prints, Woodburytypes

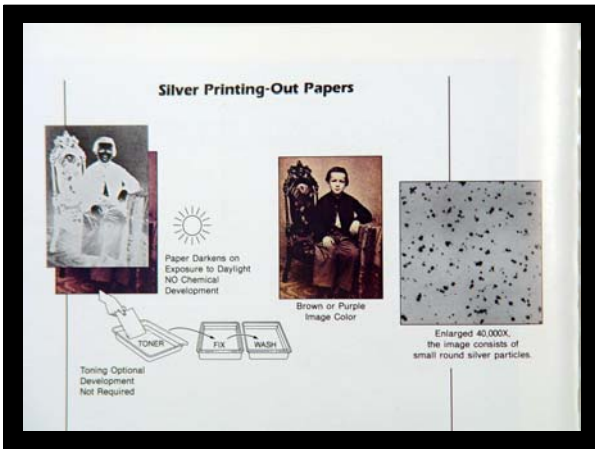
Three Layer Structures

- Added baryta layer (barium sulfate)
- Paper fibers obscured
- Glossy surface
- Glossy collodion, matte collodion, gelatin prints


Caspar
457 Essex St.
cor. Hampshire
Lawrence, Mass.


GELATIN DEVELOPING-OUT PAPER
GELATIN PRINTING-OUT PAPER


Silver Developing-Out Papers
Exposed to Weak Light
Image Appears During Chemical Development
DEV
FIX
WASH
Neutral Black Image Color
Enlarged 40,000X, the image consists of clumps of filamentary silver.

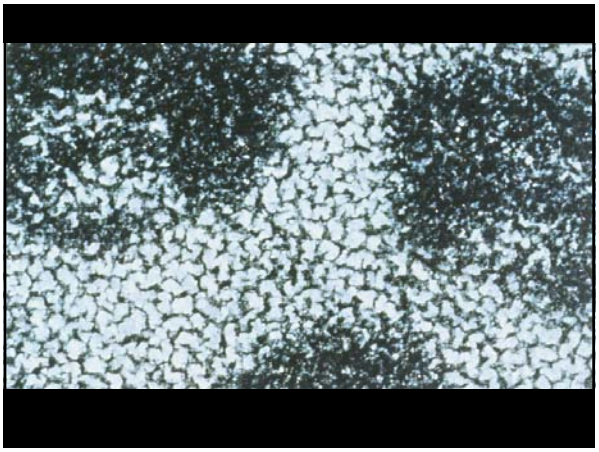

Silver Printing-Out Papers
Paper Darkens on Exposure to Daylight NO Chemical Development
TONER
FIX
WASH
Toning Optional Development Not Required
Brown or Purple Image Color
Enlarged 40,000X, the image consists of small round silver particles.

Photomechanical

- Patterned image grain
- No image fading
- Processes include
  - Collotype
  - Photogravure
  - Letterpress Halftone

Collotype

- May have multiple layers
- May be matte or glossy
- Fine reticulation pattern under magnification

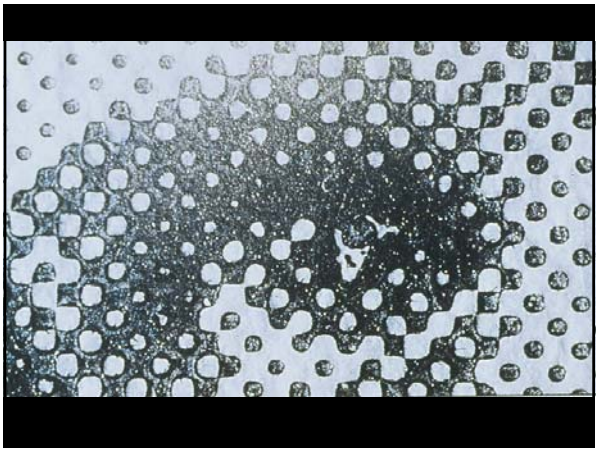


Photogravure

- Good reproduction of detail
- Aquatint grain or grid screen pattern
- Platemark
- Used for fine art

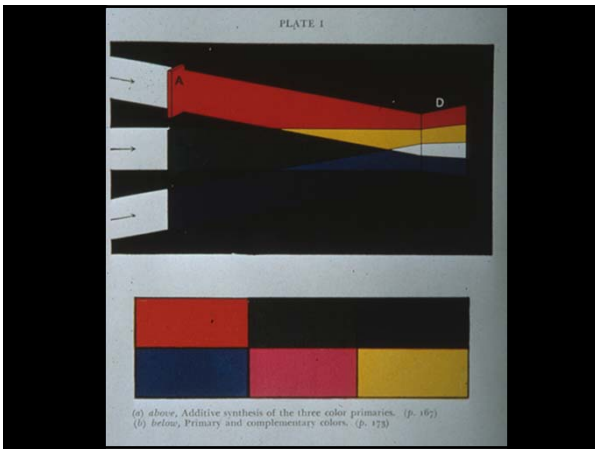
Letterpress Halftone

- Poor reproduction of detail
- Sharp-edged large dot pattern under magnification
- Newspapers



Color Materials

- *The Illustrated History of Colour Photography*
  - Jack H. Coote (Fountain Press 1993)
- Five Major Processes
  - Additive screen processes
  - Subtractive tri-color prints
  - Chromogenic color
  - Silver dye bleach
  - Dye diffusion transfer



Additive Screen Process

- Different screen patterns
- Autochrome
  - 1st commercially successful color process
  - Invented by Lumiere brothers 1907
  - Red, green, and blue starch grains on glass

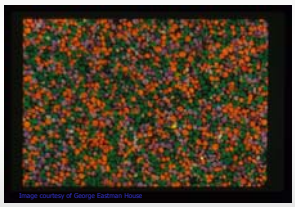


Image courtesy of George Eastman House


Images courtesy of George Eastman House

Subtractive Three Color Prints

- $ and complicated
- Fine art (Elliot Porter)
- A.k.a. dye imbibition and tri-color carbro
  - Mis-registration
  - No relief
  - Pre-1989 magenta dye fluoresces under black light
  - Excellent dark stability

Chromogenic Color (Film)

- Kodachrome 1935
- 1st chromogenic film to be marketed
- Sent out
- Emulsion relief
- Dark stability
- Lacquered until 1960
- Ektachrome 1946
- Simpler process
- Done in-house
- No relief
- Better light stability
- No good dark stability

Image courtesy of George Eastman House

Chromogenic Color

- Prints
  - 1940s-50s – pigmented (white) acetate base
    - Minicolor, Kodachrome
  - 1942 – Kodacolor – fiber base paper
  - 1969 – resin-coated (RC) paper

Image courtesy of Gary Albright

Silver Dye Bleach

- Cibachrome – 1958/1963
- Ilfochrome -1990s
- Characteristics
  - Glossy surface
  - Easily marred
  - Base is white plastic
  - Black border
  - Dark stability is excellent

Dye Diffusion Transfer

- Polaroid
  - 1940s instant b&w
  - 1963 Polarcolor – peel apart
  - 1972 SX 70
  - 1975 Polarcolor II
  - Dyes present in film before exposure
    - After exposure transfer dyes to receiving paper with aid of chemicals

Image Courtesy of George Eastman House

Digital Output Media

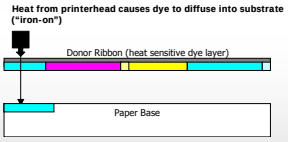
- http://aic.stanford.edu/sg/emg/juergens/
  - *The Digital Print* – Martin Jürgens (Getty 2009)
- Four Major Processes
  - Digital photo process
  - Dye sublimation
  - Electrography
  - Ink Jet

Digital Photo Process

- Fuji Pictrography & Kodak Pegasus
- Used in photo labs to print snapshots
- Heat and water used to create dye image on donor paper
- Transferred to receiving paper with heat and pressure
- Fuji claims image permanence

Dye Sublimation

- Dye Diffusion Thermal Transfer Prints
- Kodak Picture Maker at CVS and many Canon portable printers
- Works with single-color ribbon containing dye which is heated
- Dye is vaporized and absorbed into paper
- Results in smooth, seamless image



Electrography

- Laser printers and photocopiers
- Toner is transferred to an uncoated paper and fused into place
- Stable pigment particles used
- Not used for photo-quality printing

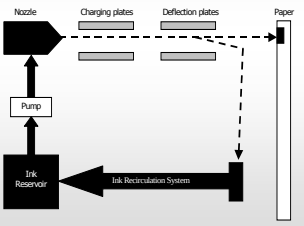
Ink Jet

- Most common printing technology for digital artists and amateurs
- Flow of colored ink from nozzle is deposited on a support
- Two types
  - Continuous flow (IRIS printer)
  - Drop-on-demand (Epson Stylus® Photo Printers and Canon "Bubble Jet" Printer)

Continuous Flow Ink Jet

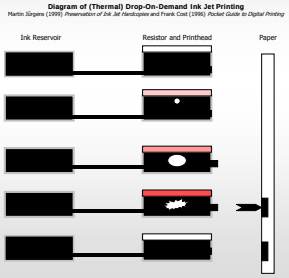
- Electrostatic charge pushes out ink in printhead reservoir
- Charged droplets are deflected and recycled
- Uncharged particles spray continuous stream onto support

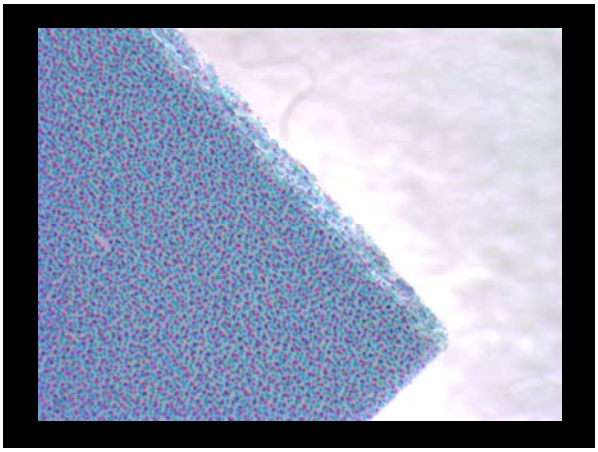
Diagram of Continuous Ink Jet Printing
Martin Jürgens (1999) *Preservation of Ink Jet Hardcopies* and Frank Cost (1996) *Pocket Guide to Digital Printing*



Drop-on-Demand

- Thermal (Canon) uses heated resistor to create bubble inside printhead and forces ink droplet out
- Piezoelectric (Epson) effect uses crystalline material to create pressure instead of heat to release ink





Conclusion

- 19th century
- Early 20th century
- Photomechanical processes
- Color materials
- Digital output media