Photo-Documentation of Ultraviolet Radiation Induced Visible Fluorescence on Daguerreotypes

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Conservation of Photographs
And Works on Paper
What will be covered

1. A brief introduction of how ultraviolet radiation induced visible fluorescence works

2. What we can see on daguerreotypes
   a. Plate
   b. Accessories: case, preserver, brass mat, cover glass, etc

3. How to record the fluorescence
   a. The basics: lamps, filters, setup, UV reference cards
   b. Action!
Part I: ultraviolet radiation induced visible fluorescence
1. UVA: 315 (320)-400 nm, longwave, black light, near-ultraviolet.
2. UVB: 280-315 (320), middlewave
3. UVC: 100-280, shortwave, far-ultraviolet
some materials glow under UV

visible fluorescence
ultraviolet radiation

fluorescence

Electron

Nucleus
Use visible fluorescence to...

- Detect materials not visible to the naked eye
- Identify materials
- Evaluate treatment
- Document/Monitor condition of objects
UVA (longwave) v.s. UVC (shortwave)

1. DO NOT use UVB

2. Most materials that fluoresce are excited by UVA; UVA is used most often in conservation

3. UVA is less damaging for both human & objects; avoid UVC if at all possible.

4. In some cases, UVC can give information that cannot be obtained with UVA
Part II: What we can see on daguerreotypes with UV

Main components in a daguerreotype

• Case
• Brass mat/Preserver
• Cover glass
• Tape/adhesive
• Plate
Wooden cases with coverings

Normal illumination

visible fluorescence, UVA
More Cases

Normal illumination

visible fluorescence, UVA
Matching lid & tray

Normal illumination

Visible fluorescence, UVA
Brass Mat & Preserver

Normal illumination

Visible fluorescence, UVC

front

back
Tape & Adhesive

Visible fluorescence, UVA

Before tape removed
Tape/adhesive removed
After treatment
Plate

Normal illumination

Visible fluorescence, UVC
visible light

UVC

Image credit: Claire Tragni & Taina Miller
Edge tarnish

Tarnish in the form of a ring

Dipped in sodium cyanide

Modern daguerreotype
Greenish fluorescence on daguerreotypes under UVC

1. Copper cyanide compound
2. Possibly from
   a. Plate making process
   b. Image making process
   c. Previous treatment--cleaning tarnish with cyanide solution
Part III: How to record the fluorescence

UV sources
- Different UV lamps
- Filters
- Setup
- workflow
1. High pressure UV lamps
2. LED UV lamps
3. Internal filtered UV lamps
4. External filtered UV lamps
UVA, Longwave Ultraviolet Radiation

High Pressure Mercury Lamps
UVA, Longwave Ultraviolet Radiation

Low Pressure Mercury Lamps
Low Pressure Mercury UVC Bulbs
Quartz envelope

Filtration for UV-induced visible fluorescence photography

- Block **UV** & **IR** produced from lamps and record only visible fluorescence emitted by the object
  - Near IR emission from UV lamps, 725nm to 800 nm with peak at 735nm
  - Cut wavelengths shorter than 400 nm and greater than 700 nm
- Filters to use: Kodak 2E
Protect Yourself

1. Avoid direct exposure to UVC
2. Protect eyes
3. Cover exposed skin
4. Be aware of ozone
   a. Ozone will be generated when UVC is turned on
   b. Ozone sensitive objects should not be exposed to UVC
   c. Can cause respiratory problems