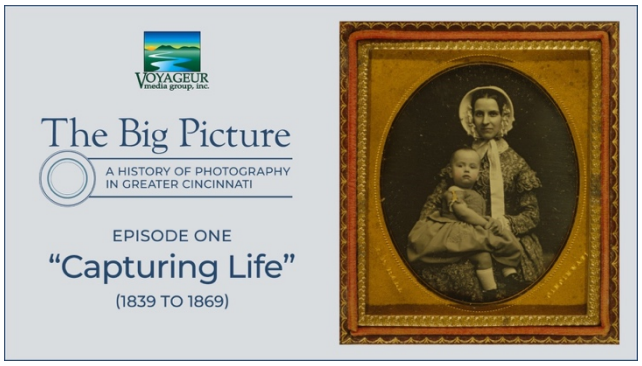

Lesson 6: Scientific Advancements in Photography

Background

The development of photography is a story of numerous scientific discoveries and advancements. The announcement of two photographic process in 1839 by William Talbot and Louis Daguerre marked the beginning of photography. From that year, photographers, including several from Greater Cincinnati, continued to make technological improvements to the new medium. Photographers worked with a variety of equipment and techniques to achieve different results. New surfaces were used, and different chemical were developed to speed up the process, provide greater resolution, make photographs more stable, and create multiple images from a single exposure.

Prompt

What scientific advancements are seen in the introduction of different photographic formats from 1839 to 1869, including: photogenic drawings (Calotypes), daguerreotypes, ambrotypes, tintypes and the wet-plate collodion process that led to photographic prints such as the carte-de-visite?

Reference Images

Image 1
Windsor Castle, salted paper print (Calotype), ca. 1841, William Talbot,
The Metropolitan Museum of Art.

Image 2
[Main Street, Cincinnati], daguerreotype, ca. 1850, James P. Ball, Cincinnati Museum Center.

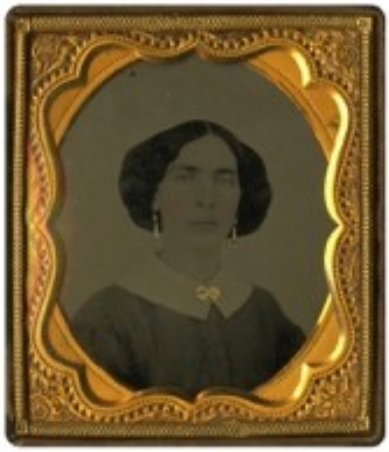

Image 3
Unidentified woman, ambrotype, ca. 1850, James P. Ball, Cincinnati Museum Center.

Image 4
Thomas C. Ball, tintype, 1850-1860, James P. Ball, Cincinnati Museum Center.

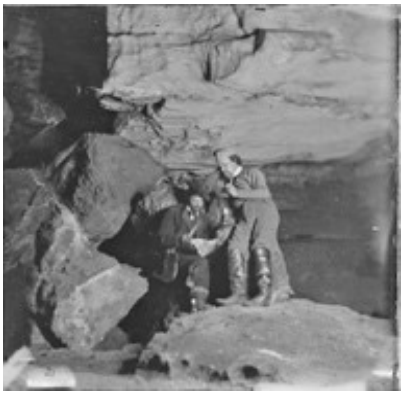

Image 5
"Beyond the Bridge of Sighs," wet-plate collodion, glass plate print, 1866, Charles Waldack, National Portrait Gallery.

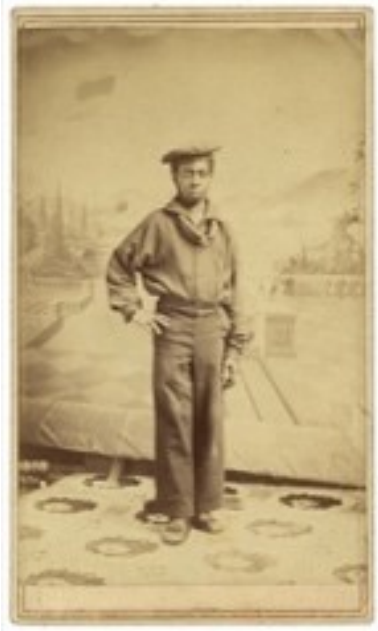

Image 6
Unidentified African America sailor, carte-de-visite, 1861-1865, James P. Ball, Library of Congress.

Academic Fields

Technology:

- Analyze and integrate textual, visual and quantitative information (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from multiple digital learning tools and resources.
- Critique specific instances of how technology has impacted access to information, communications and collaboration.
- Explain the positive and negative impact the use of technology can have on personal, professional and community relationships.
- Discuss and define how issues (e.g., economic, political, scientific and cultural) are influenced by the development and use of technology.
- Explain how new technology development is driven by factors such as commercialization, creative/inventive thinking and cultural/historical influence.

- Examine the progression of a product to identify how the functional, aesthetic and creative elements were applied.
- Synthesize textual, visual and quantitative research and data (e.g., images, diagrams, maps, graphs, infographics, videos, animations, interactives) from a variety of digital learning tools and resources.
- Select a technology and analyze its global impact across multiple disciplines.
- Debate how demand for technology and innovation have reshaped the social, cultural, political and/or economic landscape, citing references and examples.
- Discuss how technological innovation has resulted when ideas, knowledge or skills have been shared across multiple fields.
- Explain the interrelationship between technology, creativity and innovation.

Chemistry:

- Chemical reactions:
    - Reactions occur when reacting particles collide in an appropriate orientation and with sufficient energy.
    - The rate of a chemical reaction is the change in the amount of the reactants or products in a specific period of time.
    - Increasing the probability or effectiveness of the collisions between the particles increases the rate of the reaction. Therefore, changing the concentration of the reactants, changing the temperature or the pressure of gaseous reactants, or using a catalyst, can change the reaction rate.
    - Likewise, the collision theory can be applied to dissolving solids in a liquid solvent and can be used to explain why reactions are more likely to occur between reactants in the aqueous or gaseous state than between solids.
    - The rate at which a substance dissolves should not be confused with the amount of solute that can dissolve in a given amount of solvent (solubility).
    - Computer simulations can help visualize reactions from the perspective of the kinetic-molecular theory.

Documentary Reference Clips

Clip 1: The Dawn of Photography, 3:20 - 8:05
Clip 2: The Rise of Daguerreian Studios, 8:05 – 9:47
Clip 3: The Wet Collodion Processes, 18:18 – 19:24

Discussion Questions

- Discuss how photography developed starting with the camera obscura and the first fixed images in daguerreotypes or calotypes. How did scientific experiments shape the medium? You might think about chemical reactions, sunlight, exposure, light-sensitive surfaces, and lenses, for example.
- What problems were new types of photography trying to solve?
- What are some hypotheses early inventors of photography might have used?
- How did competition play into the advancement of photography?

Activities

- Create a timeline of photography in the 19th century showing new advancements with corresponding images as illustration. How do science and image connect?
- Recreate early photographic experiments and processes, for example with camera obscura or sun images.

Online Resources

- **Photographic Process Videos**: The George Eastman Museum photography collection is among the best and most comprehensive in the world. The museum also produced the best video series

on the science behind early photographic processes, from early daguerreotypes to digital prints. Archive link: https://www.eastman.org/processvideos

- **William Henry Fox Talbot:** The Metropolitan Museum of Art has a large collection of photogenic drawings (aka Calotypes) made by William Henry Fox Talbot in England. This MET website has a great introduction of Talbot's contributions to photography and downloadable examples of his early works. Archive link: https://www.metmuseum.org/toah/hd/tlbt/hd_tlbt.htm
- **Louis Jacques Mande Daguerre:** The Metropolitan Museum of Art has a good introduction to Daguerre's contributions to photography. MET Archive link: https://www.metmuseum.org/toah/hd/dagu/hd_dagu.htm
- **Frederick Scott Archer:** The J. Paul Getty Museum has several examples of Archer's early wet-plate collodion prints. Getty Archive link: https://www.getty.edu/art/collection/person/104NB5

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