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## Please Don't Break: Best Practices for Digitizing and Archiving Glass Plate Photographs

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# Please Don't Break: Best Practices for Digitizing and Archiving Glass Plate Photographs

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## ABSTRACT

Glass plate photographs, taken primarily between 1860-1930, were meant to document and preserve imagery, however, these photographs developed directly on glass are increasingly prone to destruction. With recent advances in imaging techniques, metadata, and collections care, the preservation of glass photography has evolved. This paper is a snapshot of the current best practices for preserving, digitizing, and storing glass plate and lantern slide photographs. It also features a case study from the San Diego Natural History Museum Library & Archives, which digitized a collection of 2,000+ glass photographs depicting the earliest images of flora and fauna in San Diego County, California and Baja California. Images and insights gained from digitizing this collection are shared throughout.

## Introduction

Glass plate photographs, taken primarily between 1860-1930, were meant to document and preserve imagery, however, these photographs developed directly on glass are increasingly prone to destruction. With recent advances in imaging techniques, metadata, and collections care, the preservation of glass photography has evolved. This paper is a snapshot of the current best practices for preserving, digitizing, and storing glass plate and lantern slide photographs. It also features a case study from the San Diego Natural History Museum Library & Archives, which digitized a collection of 2,000+ glass photographs depicting the earliest images of flora and fauna in San Diego County, California and Baja California, Mexico. Images and insights gained from digitizing this collection are shared throughout.

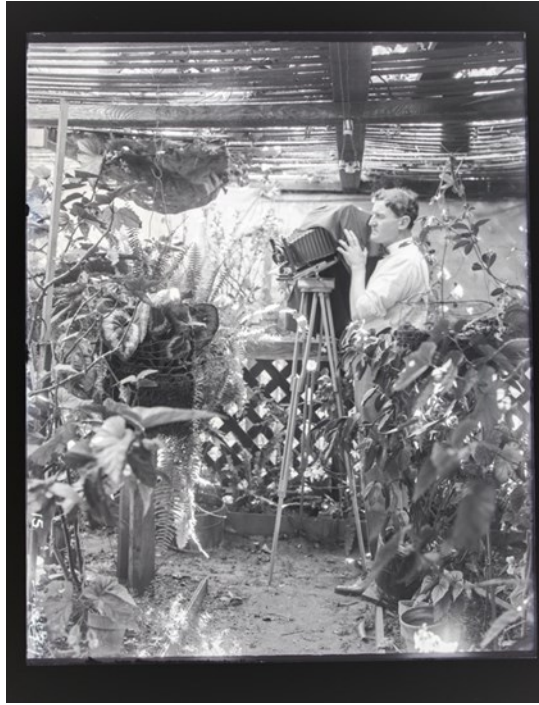


Figure 1. SDNHM Director Clinton Abbott photographing Orange-Crowned Warbler nest, 1924.

## History and Composition of Glass Plate Photography

### History

Glass photographs were the medium of choice for photographers between the metallic daguerreotypes of the early 1800s and the plastic-backed negatives of the 1930s to 2000s. The commonly used colloquial term “glass plates” is a bit of a misnomer, as photographs that were developed directly on glass include collodion wet plates, collodion dry plates, gelatin dry plates, dry lantern slides, and wet lantern slides. The authors herein use “glass photographs” unless referring to a specific type.

The first glass photographs—wet colloidal plate negatives—debuted to the public in 1851.<sup>1</sup> Wet collodion plates are made by covering a glass sheet with a thin silver halide/cellulose nitrate layer mixed with ether and alcohol, which reveals a visible

1. Jacqueline McIsaac, “Cameras in the Countryside: Recreational Photography in Rural Ontario, 1851-1920,” *Scientia Canadensis* 36, no. 1 (2014): 5-31, <https://doi.org/10.7202/1025787ar>.

image after exposure and processing.<sup>2</sup> These early glass photographic plates were immediately well-received by the photographic community, and “radically altered photography’s potential as a consumer technology by being more practical and financially accessible than any previous method.”<sup>3</sup>

By 1880, easier-to-used dry gelatin plates were developed, which follow a similar process.<sup>4</sup> However, the use of gelatin instead of cellulose nitrate in the mixture allowed for a similar output with fewer time constraints, easier transportation, and less exposure time.<sup>5</sup> The development of dry gelatin plates also made photography “less expensive and more ‘user-friendly,’” significantly improving access to this new technology.<sup>6</sup> In the 1880s and 1890s, a laborer earned around \$1 a day, a camera cost around \$10, and dry gelatin plate supplies cost around \$5, therefore photography “become a hobby that many individuals could afford.”<sup>7</sup>

Lantern slides, glass plates that are sandwiched together and trimmed in black paper tape, were made for specialty slide projectors called “Magic Lanterns.”<sup>8</sup> They were used for home entertainment, public lectures, and photographic exhibitions.<sup>9</sup> Magic Lanterns were originally lit with kerosene-based flames, and later replaced by more technologically savvy types of light sources.

## Composition

To take glass photographs, many photographers in the late 19th and early 20th centuries built their own cameras, mixed their own chemicals, and coated their own glass for image exposures. Thus, every glass plate, whether wet, dry, or lantern, has a high chance of having a variable chemical makeup from its contemporaries.

2. ISO (International Organization for Standardization), “ISO 18918:2000: Imaging Materials—Processed Photographic Plates—Storage Practices,” 2000, <https://www.iso.org/obp/ui/en/#iso:std:iso:18918:ed-1:vi:en>.
3. McIsaac, “Cameras in the Countryside.”
4. Canadian Conservation Institute, “Care of Black-and-White Photographic Glass Plate Negatives,” accessed May 2024, <https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/care-black-white-photographic-negatives-glass-plate.html>.
5. ISO, “ISO 18918:2000.”
6. McIsaac, “Cameras in the Countryside.”
7. Ibid.
8. “Lantern Slides,” Magic Lantern Society, accessed May 2024, <http://www.magiclanternsociety.org/about-magic-lanterns/lantern-slides/>.
9. “Lantern Slides,” National Gallery of Art, accessed May 2024, <https://www.nga.gov/research/online-editions/alfred-stieglitz-key-set/practices-and-processes/lantern-slides.html>.

Determining the type of glass plate is essential in determining the proper procedures for handling, cleaning, and preservation. It is important to assess every individual plate even within a small collection, as even if plates are from a relatively short time span, “most likely it includes different photographic processes and materials.”<sup>10</sup> Wet collodion plates are typically varnished, resulting in the image turning brown-yellowish tone over time. In contrast, gelatin dry plates have crisp black and white, with a metallic sheen in the highest density areas of the image due to a process called “silvering out.” In this process, the silver creating the image migrates to the surface, resulting in a thin metallic layer on top of the plate.<sup>11</sup> One can also typically differentiate plate types by analyzing the edges. Dry plates have cut edges with even, smooth processed emulsion while wet plates often have ground, uneven edges.<sup>12</sup>



Figure 2. Eyes of a wolf spider (*Lycosidae*), date unknown.

10. Catarina Luísa Cortes Pereira, Carolina Barata, Rita Gaspar, and Laura Castro, “Retouching Scientific Photography—the Glass Plate Negatives Collection at the Natural History and Science Museum—University of Porto,” *Ge-Conservacion* 12 (December 2017): 101-10. <https://doi.org/10.37558/gec.v12i0.540>.
11. Canadian Conservation Institute, “Care of Black-and-White Photographic Glass Plate Negatives.”
12. Robert Herskovitz, “Storage of Glass Plate Negatives,” *Minnesota History Society Tech Talk*, July 1999, <https://www.mnhs.org/sites/default/files/lhs/techtalk/techtalkjuly1999.pdf>.

## Archiving Glass Plate Photography

### Handling

The goal when digitizing glass photographs is to handle them as little as possible. When glass plates are handled less often, the chance of additional deterioration decreases.<sup>13</sup> In accordance with the National Archives and Records Administration's archival storage standards, when handling glass plates, it is imperative to use clean, flat, dry surfaces and wear non-vinyl plastic gloves made of latex or nitrile.<sup>14</sup> Cotton gloves are not recommended for glass photographs as the risks of dirt transfer, snags on the microfibers of the gloves, and the slippery nature of glass are too great for the delicate materials.<sup>15</sup>



Figure 3. Three adults and one child in a car, date unknown.

13. Jane Metters LaBarbara, "Brush the Dust Off: Identifying and Cleaning Glass Plate Negatives," September 2014, <https://news.lib.wvu.edu/2014/09/02/brush-the-dust-off-identifying-and-cleaning-glass-plate-negatives/>.
14. "How Do I House Glass Plate Negatives?" National Archives and Records Administration, accessed May 2024, <https://www.archives.gov/preservation/storage/glass-plate-negatives.html>.
15. "Preservation Recommendations for Historic Glass Astronomical Plates," Harvard Library, accessed May 2024, <https://preservation.library.harvard.edu/historic-glass-astronomical-plates>.

Glass photographs should always be handled by holding two opposite edges. It is imperative to avoid holding them by one edge or corner to minimize the risk of dropping and damaging the plates.<sup>16</sup> Avoid placing any pressure on the plates by never pressing on, stacking, leaning, or writing on them. Stacking glass plates (either horizontally or vertically) without cushioning material is never recommended, as the plates can cause damage to each other. It is also recommended to work with the plates one at a time.<sup>17</sup> Glass plates should typically be placed with the emulsion side facing up when imaging, to reduce risk of damage to the emulsion and reduce reflections, however they should be cleaned with the glass side up.

## Cleaning

Cleaning glass photographs provides a clearer image and helps remove damaging particles such as dirt, dust, mold, and other residues. Cleaning glass photographs also prolongs storage life, ensures that no oily fingerprints are left on the glass, and can help maintain the collection.<sup>18</sup>

To clean glass photographs, light boxes can be used to help identify problem areas on the glass. Before and after use, as well as in between each glass plate, the light-box surfaces should be cleaned using a soft dusting brush and a soft tissue.

For the plates themselves, it is imperative to identify the difference between the glass side and the emulsion side of the glass photograph. There are many ways to determine the emulsion side of glass plates. Some glass plates may have markings, brand labels, or stickers on the glass side. The orientation of the text on the image (normal or inverted) is also an indicator of the glass side. Finally, the duller side of the two is the emulsion side, while the shinier side is the glass.

While cleaning, it is recommended to put a small rubber pad underneath the glass plate, as it can help reduce the likelihood of breaking slides in the cleaning process. Next, using the soft dusting brush, brush the glass side of the photograph gently from center outwards to remove dirt, dust, cobwebs, and broken glass particles. Dusting brushes are recommended over aerosol dusters because of the risks of liquid leakage and emulsion flaking when using compressed air.

If the glass side of the plate remains stained by liquids, handprints, or dirt after the brushing process, it is possible to carefully wash the glass slide. For water-based stains, gently wash the glass side using distilled water and a cotton swab. For oil-based stains, clean the glass side with a safe lens wipe such as PEC-PAD nonabrasive wipes and PEC-12 archival photographic emulsion cleaner. Using no more than a drop

16. National Archives, "How Do I House Glass Plate Negatives?"

17. Ibid.

18. ISO, "ISO 18918:2000."

of PEC-12, use small circular motions and concentrate on one small section at a time to clean. It is of the highest importance to be cautious when cleaning cracked plates, as the cleaning solution can easily seep into the cracks of the glass plate. Alcohol mixtures and acetone should never be used to clean wet-process plates, as they will dissolve the collodion present and strip the image from the plate altogether. Washed plates should be left to dry on cleaned surfaces before rehousing to reduce the risk of mold growth.

It is recommended to refrain from cleaning the emulsion side with brushes or water unless in extreme conditions, as the risk of ruining the emulsion is extremely high.<sup>19</sup> One such extreme condition is mold. The gelatin emulsion on glass plates can harbor and breed mold and other types of fungi. If the glass plate has white or brown patches along the edges or cracks, there is likely mold damage on the slide.



Figure 4. California Giant-Skipper (*Agathymus stephensi*), date unknown.

19. LaBarbara, "Brush the Dust Off."

20. ISO, "ISO 18918:2000."



## Housing & Storage

Photographic plates require protection against physical damage like scratches, abrasions, fingerprints, and breakage, while also requiring optimal temperatures and relative humidity to prolong their shelf-life.<sup>20</sup> Thus, housing and storage issues are integral in any discussion of glass plates. For this reason, each glass plate and lantern slide should be housed in individual archival quality sleeves before boxing. Storing individual glass plates in suitable individual envelopes or folders allows the exclusion of dirt, protection of the plates against mechanical damage, and facilitates identification and handling.<sup>21</sup>

## Housing

For the rehousing of glass plates, it is recommended to use high quality, lignin-free, sulfur-free, alum-free, pH 7-8.5 paper stock, meeting the requirements of the American National Standards.<sup>22</sup> Per the U.S. National Archives and Records Administration recommendations, glass plate photographs should be categorized as: complete glass plates, minor flaking plates, significant flaking plates, and broken glass plates.<sup>23</sup> Each of these categorizations also has their own rehousing procedure.

Complete glass photographs, characterized as glass plates that are not broken or flaking individually, should be housed in loosely fitting buffered paper sleeves with side seams.<sup>24</sup> The glass plates should be placed in the sleeves with the emulsion side away from the seams to reduce the risk of abrasions by insertion and removal from the envelope, and to reduce deterioration of the image due to prolonged contact between the seam adhesives and the emulsion.

Glass photographs are categorized as “minor flaking” if there are small edge losses and glass chipping at edges where the emulsion appears stable and secure with no lifting at the edge and no flaps of emulsion.<sup>25</sup> These plates should be housed with the handling note “Flaking edges: remove/insert with care.”<sup>26</sup>

Glass plates are categorized as “significant flaking” if the flaps of emulsion could be torn off or are cracking with blind cleavage at the interior.<sup>27</sup> These plates should be

21. ISO, “ISO 18918:2000.”

22. Ibid.

23. National Archives, “How Do I House Glass Plate Negatives?”

24. Ibid.

25. Ibid.

26. Ibid.

27. Ibid.

housed with the handling note “Flaking glass plate: handle with extreme caution.”<sup>28</sup> The broken pieces from broken or deteriorated glass plates should be sandwiched between two sheets of buffered board and placed into four-flap enclosures to stabilize the damaged plate.<sup>29</sup>

Similar distinctions can be used for the black paper on the edges of lantern slides, as the paper that secures lantern slides together starts to degrade around the 70-year mark. All boxes of glass plates, no matter their categorization level, should be clearly labeled as “Fragile—Glass,” preferably in red to attract attention.

## Storage

Dark storage conditions should be used for the preservation of gelatin and processed photographic plates to protect them from prolonged exposure to light.<sup>30</sup> Photographic film and prints should not be stored together within the same enclosure or container as glass photographic plates, and different types of photographic plates should be housed separately according to type.<sup>31</sup> These enclosures and containers should allow vertical storage of plates (on their side), as storage of plates in a horizontal position (lying flat) can increase pressure and cause cracks unless significant buffering precautions are taken. Plates from the 19th century are especially susceptible to stress-related fractures during horizontal storage. Photographic plates should be stored in vertical storage cabinets with tightly fitting doors, or inside closed containers on open shelves.<sup>32</sup>

Glass photographs should be placed in shelving designed to bear a heavy weight load and made of anodized aluminum, stainless steel, or steel finished with non-plasticized synthetic resin-power coating rather than on wood, pressed-board, particleboard, plywood, or other materials that are combustible and corrosive in nature and pose the danger of producing active deteriorating agents as they age.<sup>33</sup> Containers should be placed so that the weight is centered on the shelving (or inside the drawer), reducing the risk of shelving or cabinets toppling over due to uneven weight distribution.<sup>34</sup>

28. National Archives, “How Do I House Glass Plate Negatives?”

29. Martine Gillet, Chantal Garnier, and Françoise Flieder, “Glass Plate Negatives. Preservation and Restoration,” *Restaurator* 7, no. 2 (1986), <https://doi.org/10.1515/rest.1986.7.2.49>.

30. ISO, “ISO 18918:2000.”

31. *Ibid.*

32. *Ibid.*

33. *Ibid.*

34. ISO, “ISO 18918:2000.”

In the storage of glass photographs, the relative humidity and temperature levels should also be regulated. Relative humidity alone or in combination with chemical reactants present in the storage environment can deteriorate the photographs.<sup>35</sup> Fluctuations in relative humidity should be avoided as they increase the strain on adhesions of the gelatin to the glass plate as the gelatin expands and contracts.<sup>36</sup> According to the International Organization of Standardization, the acceptable relative humidity level for the storage of glass plates is between 20% and 50%, with the preferred level below 40%. Relative humidity level should never exceed 60%. Additionally, the recommended temperature for the storage of glass photographs is between 59°F and 77°F, with a preferred temperature below 68°F.<sup>37</sup> Chemicals such as peroxides, hydrogen sulfides, or ozone should not be stored in the same environment.<sup>38</sup>



Figure 5. Man drinking from a Bisnaga (*Ferocactus*), date unknown.

35. Canadian Conservation Institute, "Care of Black-and-White Photographic Glass Plate Negatives."

36. Ibid.

37. Ibid.

38. ISO, "ISO 18918:2000."

## Digitizing Glass Plate Photography

Digitization refers to the process of creating digital images of physical items, yet this process requires many steps. And while the equipment needed for digitizing glass photographs exists in a variety of price points, the basic tenets remain the same: imaging, editing, describing (with metadata), archiving, and sharing.

### Imaging

To image glass photographs, it is necessary to have a camera and a light source, as glass photographs must be backlit to render the images visible. Best practices recommend a flat lightboard for consistent illumination, a camera copy stand, and a camera with focus peaking and aperture priority to achieve the highest quality images. For the lightboard, also known as a light table, it is recommended to use one with a coloring rendering index of 90+ and 5000-5500k light temperature.<sup>39</sup> Cameras should be mounted to the copy stand with overhead mounts to ensure consistent imaging; best practice is to use a level to ensure the camera and light table are parallel to each other.

### Editing

While editing images for commercial or marketing practices is acceptable, editing photographs of physical items for archival purposes is typically not recommended. To edit the images for archival purposes, it is best practice to make only minimal adjustments, such as converting negatives to positives. For copies of the digitized images to be used for marketing purposes, etc., it is acceptable to edit the contrast, exposure, brightness, etc. or to touchup breaks in the glass or emulsion. It is also acceptable at this phase to add watermarks or logos to copies of the digitized images, however this should again only be done with non-archival copies of the images.

### Description—Metadata

The metadata for glass photographs may come in the form of supplemental materials; institutional, personal, or expert knowledge; or may even be on the plates themselves, written onto the paper edgings or directly on the glass. Metadata from this information can be created for the entire collection, specific boxes or containers, individual images, or a combination thereof. This information not only helps users in the search and discovery phases of seeking digitized images, but it also helps organize and adds context and provenance to digital images.

Workflows for adding metadata vary. Some prefer to work with the metadata after the glass photographs are imaged, while others prefer to have the metadata completely organized before imaging. The timing of metadata inclusion must be made by considering the conditions of the glass photographs and their storage

39. "Film Scanning Best Practices," Negative Lab Pro, accessed May 2024, <https://www.negativelabpro.com/guide/scanning/>.

facilities, the level of metadata available, and the availability of staff dedicated to the process. The best way to add metadata to digitized images is to use a program that embeds metadata within the image.<sup>40</sup> This guarantees that the metadata is always connected to the image and can be extracted from the EXIF data. Adobe Lightroom and similar programs can perform this function. In addition, it is also helpful to keep local files, software, or databases that detail the metadata associated with the images in the glass photographs.



Figure 6. Clinton Abbott showing a taxidermy elk to a group of schoolchildren, date unknown.

### Storage—Digital Archives

To archive the digitized images, it is important to follow the 3-2-1 digital preservation standard by saving three copies of every digital image, in two different

40. Stephanie Ogeneski Christensen, Doug Dunlop, Suzanne Pilsk, Rebecca Snyder, Ducky Nguyen, Sarah Stauderman, Stephanie Smith, et al. (Embedded Metadata Working Group), “Basic Guidelines for Minimal Descriptive Embedded Metadata in Digital Images,” accessed May 2024, <http://repository.si.edu/xmlui/handle/10088/9719>.

file formats, with one copy saved in a different location.<sup>41</sup> RAW or TIFF file types are best for long-term storage because they are less prone to bit-rot and therefore less likely to degrade over time. Uncompressed TIFF files are typically quite large, which allows for printing at considerable scale without pixelating, however they also take up much more storage space. These file formats are typically best saved in rarely used storage locations, as their size slows down most computing processes, and the full-size uncompressed images are not frequently needed for everyday use. In practice, the authors have found it best to take the initial images of the glass plates in RAW format, and then save additional copies in compressed file formats. Commonly used compressed file formats include JPEG and PNG. These files are smaller and load faster on websites and computers, which allows for easier shared use.

## Sharing

Finally, it is important to share digitized images of glass photographs, both to educate others on the unique existence of these items while also limiting contact and handling. For the authors, sharing digitized images and the standards for doing so are the key additions to the updated literature on best practices for glass photographs. Much of the previous literature was written at least a decade ago, and much has changed in the information and communication technology landscape in that time.

For glass photograph imaging projects, it is necessary to create multiple points of access to the visual and historical information obtained from these glass plates. Publishing collection information in multimedia form creates a rich resource for researchers and specialists. Images accompanying textual records enhance the collections for audiences of different ages and interests across the world and create a basic resource for interpretative applications to be built on.<sup>42</sup> Work in digital humanities, digital archives, and museum informatics can attest to the audience for and varied applications of these materials.

Through the digitization of cultural collections, these resources can be used for multiple purposes, including educational and interpretive research. Digitized collections allow viewers to zoom in and examine details of glass photographs which would not otherwise be seen in a display case or by the naked eye. For cultural institutions, digitization offers the ability to display an entire collection, as large parts of it would not typically be on public display, and to reach those who cannot visit in person. Other benefits include the ability to adjust interpretative applications for users with disabilities or special needs.

While social media sites are a natural place to promote such images, they should be used as a secondary location. Best practices recommend a primary location for all

41. "Digital Preservation Basics," Vassar Libraries, accessed May 2024, <https://library.vassar.edu/c.php?g=1218328&p=8911412>.

42. Paul F. Marty and Katherine Burton Jones, *Museum Informatics: People, Information, and Technology in Museums* (New York: Routledge, 2008).

images to be shared with the public, such as a website, digital asset management system (DAMS), database with a strong graphical user interface (GUI), or dedicated photo storage site such as Flickr. With new technologies and protocols for database searching, the importance of cultural institutions offering digital access to their collections allows for the possibility of cross-collection and cross-institutional searching.<sup>43</sup>



Figure 7. The Organ Pavilion in Balboa Park, San Diego, California, circa 1915.

## Case Study

### San Diego Natural History Museum

The potential to use photography in the service of science was first demonstrated by Alfred Donn  and L on Foucault at the Academy of Sciences in 1840, where they wrote that with photography, “the object itself will be placed before the eyes and in the hands of the audience.”<sup>44</sup> Thereafter, photography became a crucial addition to the natural sciences to accurately represent species and environments. Photographs

43. Marty and Burton Jones, *Museum Informatics*.

44. Pereira et al., “Retouching Scientific Photography.”

of people's daily lives also became important for the scientific field of anthropology.<sup>45</sup> The technological advancement of dry gelatin glass photographic plates further “allowed for great development of the use of photography in science, since the time photographers needed to prepare glass photographic plates was significantly reduced.”<sup>46</sup>

The San Diego Society of Natural History, now called the San Diego Natural History Museum, began in 1874 and has studied the unique flora and fauna of southern California and the Baja California peninsula for 150 years. Originally founded by amateur naturalists in the Victorian era, it has grown to a venerable institution internationally recognized for its research, discoveries, programs, and exhibitions.

The San Diego Natural History Museum (SDNHM) Research Library & Archives contains over 12,000 individual photographs on various media, including print, digital, and plastic film formats. Included in this number was a previously un-curated collection of 2,000+ glass photographs and lantern slides representing some of the earliest images of flora and fauna in Southern California and the Baja California peninsula. SDNHM was awarded a grant from the Parker Foundation to digitize, describe, and share these glass photographs so that the collection can be used for research, education, and future exhibits. SDNHM’s glass photograph digitization project also furthers the movement of “international research efforts to disclose hidden collections of photographic archival records.”<sup>47</sup>

The glass photographs in the collection were created by early community scientists and naturalists, and they document expeditions around the southwestern United States and Baja California; research on reptile, mammal, and insect species; and the everyday life of San Diegans in the late 19th and early 20th centuries. Prominent photographers from this collection include Frank Stephens, Laurence Huey, Ethel Bailey Higgins, and Lee Passmore.

Frank Stephens was an early member of the San Diego Society of Natural History and dedicated his life to creating a museum for the nascent society, becoming its first Director and first Curator of Mammalogy, and donating his collection of over 2,000 birds and mammals to the San Diego Society of Natural History.

45. Wouter Claes, Marleen De Meyer, Aude Gräzer Ohara, and Athena Van der Perre, “Unlocking the Photographic Archives of the Pioneering Years of Egyptology at the Royal Museums of Art and History in Brussels” (Brussels, Belgium: Belgian Science Policy Office, 2023), [https://www.belspo.be/belspo/brain2-be/projects/FinalReports/SURA\\_FinRep.pdf](https://www.belspo.be/belspo/brain2-be/projects/FinalReports/SURA_FinRep.pdf)

46. Pereira, et al., “Retouching Scientific Photography.”

47. Claes, et al., “Unlocking the Photographic Archives.”

48. “Laurence Huey (1892-1963),” San Diego Natural History Museum, accessed May 2024, <https://www.sdnat.org/about-us/history/huey>.



Laurence M. Huey, the Curator of Birds & Mammals from 1923 to 1961, wrote over 200 scientific papers and named 94 species of birds and mammals in California, Arizona, Utah, Mexico, and Baja California. Under Huey, the Museum's bird collection became the 19th largest in the United States and included his private collection of over 4,000 birds and 1,000 mammal skins. Huey took photographs throughout his career, and upon his retirement, had "20,000 feet of uncut film still to edit and thousands of still photographs."<sup>48</sup>

Ethel Bailey Higgins began her career as a photographer in 1900 and was so well-regarded that she exhibited her prints at the Panama-California Exposition in Balboa Park in 1915. Higgins mainly photographed plants and began studying botany to better identify the specimens in her photographs. After her husband passed during the great depression, Higgins turned to botany as a full-time career when she was 67 years old. She became SDNHM's Curator of Botany at 77 and remained with the museum into her 90s. She donated most of her glass photographs documenting flora in Southern California to the museum archives.

Levi "Lee" Passmore was a portrait photographer and citizen scientist obsessed with using his rotating panoramic camera, a Kodak Cirkut 10, for observations of nature. Passmore primarily focused his nature photography on tarantulas, black widows, mud dauber wasps, and rattlesnakes. Passmore was an early member of the

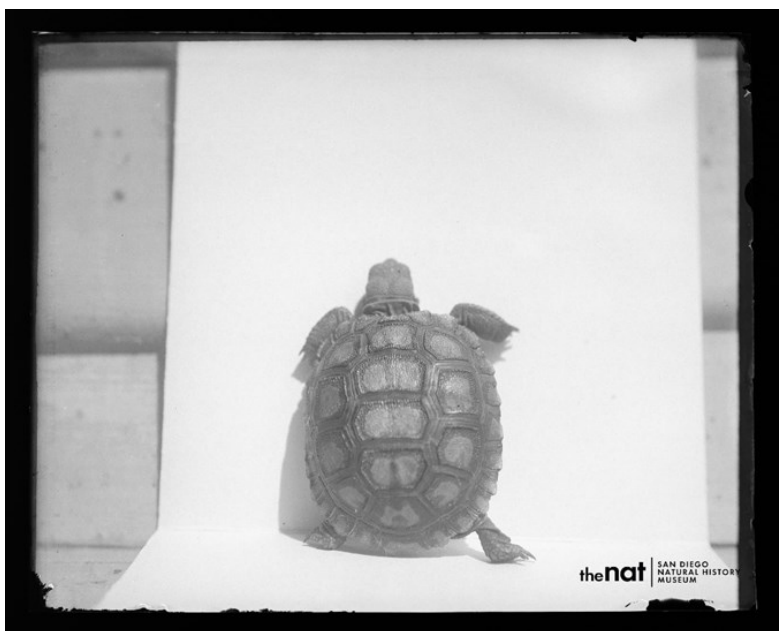


Figure 8. Turtle, date unknown.

San Diego Society of Natural History, and his research and photography were featured in *National Geographic*, *Popular Science*, *Nature*, and *Life*.<sup>49</sup>

### Digitizing SDNHM's Glass Photographs

Unfortunately, the glass photographs SDNHM's early naturalists donated were stored in less-than-ideal conditions for nearly a century. Many of the original boxes (including tackle and cigar boxes) were packed tightly with glass photographs, laid horizontal, covered in dust, and stored next to a bright west-facing window. A few of the boxes were damaged by mold, however only one photograph was identified as mold damaged.

For imaging, the authors used one DSLR camera (Canon rebel t3i), one mirror-less camera (Canon M50), two lightboards, and a Glide Gear TMP OH100 camera mount. The scans of the glass plates were captured as RAW files with an aperture priority at  $f/8$  or  $f/11$ , and manual focus settings in live view.

Luckily, the citizen scientists and curators of the San Diego Society of Natural History that took these images also took extensive notes. Many of the images include information about the photographer, date, subjects, and places; all of which enhance the collection's historical, cultural, and scientific value. The authors also combined catalogs and scrapbooks of information with the information on the glass plates to contribute to the metadata for many of the images. Where possible, images were tagged by date, location, photographer, subjects, size of glass plate, presence of handwriting on plate, presence of label on plate, and notes added. By cross-referencing this wealth of information with the knowledge of SDNHM's museum curators, the authors were able to further identify both significant persons in the photographs as well as many plant, reptile, insect, and animal species. This valuable information is the foundation for description, discovery, retrieval, and research of the collection, both internally and on SDNHM Research Library's Flickr account.

### Completed Digitization Project and Future Directions

SDNHM's collection of 2,000+ glass plates are now fully digitized (imaged, described, stored, and shared) and rehoused and stored in proper conditions. We await the opportunity to analyze the data around use and engagement for the digitized images, and we have also begun to discuss further ways to highlight the glass plates. One such project is a community science initiative on Zooniverse (a community science tagging platform) to determine the unknown species, persons, and locations in the glass photographs.

Project apprentices Noelle Zocco, Alejandra Tomeo, and Diego Jimenez also produced exciting proposals from their work. Zocco produced an exhibit proposal

49. "Lee Passmore (1874-1958)," San Diego Natural History Museum, accessed May 2024, <https://www.sdnhm.org/about-us/history/lee-passmore-1874-1958>.

and digital photo exhibit titled *Where We Find Ourselves: A Glass Plate Display* that offers an in-depth look at the lives of early citizen scientists and curators of the San Diego Society of Natural History and the Natural History Museum. The collection documents the expeditions the early curators took, the research on mammalian, reptile, and insect species they conducted, and the lives of San Diegans in the late 19th and early 20th centuries. Jimenez compared imaging quality with extremely different cameras at different price points: a Fujifilm GFX100s, a Canon EOS M50, a Canon Rebel t3i, and an iPhone 6s. He also created a step-by-step guide to digitizing film and glass plate negatives, which could be shared online for other cultural heritage organizations and the public. Tomeo created an art gallery curation proposal. She also took and developed glass plate photographs of SDNHM curators and staff. For this, she used a Calumet 4x5 rail large-format camera and displayed the modern images side-by-side with a curated collection of historical glass photographs.

Our glass photograph digitization project was only made possible with a generous grant from the Parker Foundation, which covered not only the materials needed, but also the salaries of three paid apprentices from local community colleges. The apprentices all brought their own expertise to the project in the forms of historic camera knowledge, photography backgrounds, and museum exhibits training. The apprentices also received social media training for organizations and promoted the collection and digitization process through blog and social media posts, culminating in museum-wide presentations on their projects. This extensive work and professional development were costly; however, the historical significance of the collection justified the care and expense to preserve the glass plates and make them available to scientific researchers and the public alike, and we believe that training the next generation will pay dividends in the future.



Figure 9. Young woman holding a crab, date unknown.

## Conclusion

Historical photography collections provide a direct window into the culture of communities and individuals, what their lives, surroundings, technologies, and interests looked like. Glass photography not only depicts those historically important moments, but it is also a beautiful relic of time itself and needs to be preserved as such. The cultural and historical significance of glass plate photographs, as well as their extreme fragility, make them ideal archival candidates for digitization and proper storage.

Each glass photograph digitization project is unique and multifaceted, but each also comes with distinct phases for different tasks. This paper provides current best practices for archiving and digitizing glass photographs, including the handling, cleaning, imaging, describing, housing, storing, and sharing of glass plates. More research in glass plate photography is needed for optimal camera formats and settings, public outreach and education, and a comparative chemical analysis of hand-mixed glass plates.