

Rochester Institute of Technology

**RIT Digital Institutional Repository**

---

Theses

---

5-2018

## **Inspecting Nitrate Silent Cinema: Case Studies from the John E. Allen Collection of the George Eastman Museum**

Lauren Hubbs

*Rochester Institute of Technology*, [lxh3966@rit.edu](mailto:lxh3966@rit.edu)

Follow this and additional works at: <https://repository.rit.edu/theses>

---

### **Recommended Citation**

Hubbs, Lauren, "Inspecting Nitrate Silent Cinema: Case Studies from the John E. Allen Collection of the George Eastman Museum" (2018). Thesis. Rochester Institute of Technology. Accessed from

This Thesis is brought to you for free and open access by the RIT Libraries. For more information, please contact [repository@rit.edu](mailto:repository@rit.edu).

ROCHESTER INSTITUTE OF TECHNOLOGY

COLLEGE OF LIBERAL ARTS

INSPECTING NITRATE SILENT CINEMA:  
CASE STUDIES FROM THE JOHN E. ALLEN COLLECTION  
OF THE GEORGE EASTMAN MUSEUM

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE  
BACHELOR OF SCIENCE DEGREE IN MUSEUM STUDIES  
DEPARTMENTS OF PERFORMING ARTS AND VISUAL CULTURE AND HISTORY

BY

LAUREN HUBBS

APRIL 2018

## Table of Contents

Abstract . . . . .	2
Literature Review . . . . .	3
History of Film . . . . .	4
The Beginning of Nitrate . . . . .	4
Perishing American Silent Films . . . . .	5
Noteworthy Cinema . . . . .	9
Care and Preservation . . . . .	13
Early & Current Nitrate Preservation Practices . . . . .	13
Caring for the Remaining Films . . . . .	16
Case Studies . . . . .	19
Historical Importance Based on Producer . . . . .	21
<i>Garden of Allah</i> [1916] . . . . .	24
<i>Plain Jane (The Hick)</i> [1916] . . . . .	26
<i>Call of Her People</i> [1917] . . . . .	28
<i>Carmen (Gypsy Blood)</i> [1918] . . . . .	29
Findings and Analysis. . . . .	29
Conclusion . . . . .	30
Bibliography . . . . .	32
Appendix A . . . . .	35
Appendix B . . . . .	36

## **Abstract**

This thesis emphasizes the need to conserve nitrate silent films and to raise awareness that digital copies are not the only solution. Digital copies cannot fulfill all conservation and preservation needs. After reviewing the work of a film historian, archival experts, and several academics in the field of film and archives, I chose silent nitrate films dating from the early 20<sup>th</sup>-century as case studies. The selected films, part of the John E. Allen Collection of the George Eastman Museum (GEM) in Rochester, NY are housed in the nitrate vaults at the Louis B. Mayer Conservation Center in Chili, NY, although they were originally stored offsite before being brought to the nitrate vaults in the late 1990s. The films are considered orphan films, films without owners, they were abandoned and placed in poor conditions. The films have varying levels of decomposition. The methodology consists of inspecting the titles reel by reel and comparing the decomposition levels from previous inspection in 2000 to the present, 2018. The research and findings produced in this thesis show to what extent the storage conditions in the nitrate vaults have slowed decomposition and what conservation issues remain. In addition to researching the relevance of the particular films examined and the broader field of nitrate film studies, this thesis expresses the need for increased public awareness for conserving nitrate, in an effort to preserve nitrate silent films before they disappear.



Silent films are an important part of our cinematic history; sadly, they went largely unappreciated after talking films began being produced. “Much of what survives is the result of the efforts of U.S. and international film archives curating their collections – identifying titles of interest and then actively seeking copies, building relationships with rights-holders, and occasionally acquiring entire collections.”<sup>1</sup> Many films were lost to decay, fire, or have been unable to be located. Funds for the archives housing the surviving titles are a significant challenge for their preservation. Archives want to preserve not only major motion picture films but also historic newsreels and orphan films. Films without owners are termed orphan films. Without earmarked preservation funds, many movie studios, producers, and private collectors left their films behind. Other films remain in storage, unable to be preserved properly.<sup>2</sup>

This literature review surveys silent film preservation and the importance of other noteworthy types of cinema, newsreels, and orphan films, drawing on the work of film historian and archivist David Pierce, archive film technology specialists Paul Read and Mark-Paul Meyer, author and archival expert Anthony Slide, as well as several academics in the field of film and archives.<sup>3</sup> The literature review also provides a backdrop to the particular case studies I have chosen to inspect from the John E. Allen Collection. The case studies are orphan nitrate films and poor storage conditions have contributed to their decomposition. The reassessment of their importance occurred in 1975 when they were donated to the George Eastman Museum (GEM), but it was not until 1995 that the films came to the Louis B. Mayer Conservation which was built

---

<sup>1</sup>David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 15.

<sup>2</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 1-73.

<sup>3</sup> David Pierce is an audio-visual archivist and motion picture historian and is currently working as the Assistant Chief of the National Audio-Visual Conservation Center at the Library of Congress. Anthony Slide is currently active in the field as an archivist, historian, and appraiser since 1968. Mark-Paul Meyer is working as the curator at the EYE Film Institute Netherlands. Paul Read was previously a member of the International Federation of Film Archives (FIAF) Technical Commission.

by GEM, creating nitrate vaults to properly store the John E. Allen Collection under more suitable conditions.

## **History of Film**

### The Beginnings of Nitrate

Before nitrate became a motion picture film material, it had multiple functions that ranged from scientific practices and applications to items of everyday use for the public. In the early 1800s, experiments began with celluloid, scientists were taking celluloid fibers and soaking them in nitric acid and then adding a solvent creating a synthetic material that can be used in a variety of ways. The first use of nitric acid and cellulose came by accident when the acid was spilled onto a cotton apron and was soon found out to be flammable when hung to dry by an oven. This created the discovery of guncotton, or also called nitrocellulose, which was an explosive material. Scientist, Christian Friedrich Schönbein (1799-1868), continued experimenting with solvents on nitrated cellulose and found that the solvent, ethyl alcohol, produced a liquid, collodion, that was used in photography. Collodion used as an emulsion “allowed much shorter exposure times for a photographic subject, an advantage which led directly to the development of ‘instantaneous’ photography and lightweight hand cameras.”<sup>4</sup>

Beyond photography, in 1870 the use of celluloid as a “formable plastic” was used in dental practices to create false teeth, bridges, and dental plates. Other non-dental related uses included the making of billiard balls, combs, “harness trimmings, knife cutlery handles, emery

---

<sup>4</sup> Deac Rossell, “Exploding Teeth, Unbreakable Sheets, and Continuous Casting: Nitrocellulose, from Guncotton to Early Cinema” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 37-38.

wheels, brushes, shirt cuffs and collars, shoes, piano keys, and a vast range of other items.”

Celluloid was also used for making the limbs of dolls, the hands, feet and heads.<sup>5</sup>

Celluloid became a substitute for glass plate negatives in photography in 1888 because the formable plastic was not as bulky as the glass plates. Moreover, celluloid was flexible, unbreakable, and weighed less than glass plates. This led to the “development of roll-film holders for lightweight and amateur cameras.” Advancements in emulsion chemistry allowed celluloid to be made into a thin sheet that could be rolled up on a spool.<sup>6</sup> By the late 1890s, there was a market for celluloid in the use of still-cameras and moving images. The “Eastman Kodak Company, was the first supplier of moving-picture negative and positive film.” The Blair Camera Company was another major supplier at the time, creating a thinner celluloid that was more translucent, making it better for viewing. The Eastman Company bought out the Blair Camera Company in 1899 and took hold of their superior celluloid roll film. Eastman took over the film market from 1900 on.<sup>7</sup> Nitrate was the main film stock of the early 1900s and its material properties came with added consequences leading to threats to silent films survival.

### Perishing American Silent Films

The threats to the survival of silent nitrate films include: decay from poor storage, non-profitability lead to films being thrown out or melted down for the silver content of the emulsion, and intentional destruction for vault space or to cut back on storage costs.

---

<sup>5</sup> Deac Rossell, “Exploding Teeth, Unbreakable Sheets, and Continuous Casting: Nitrocellulose, from Guncotton to Early Cinema” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 39-40.

<sup>6</sup> Deac Rossell, “Exploding Teeth, Unbreakable Sheets, and Continuous Casting: Nitrocellulose, from Guncotton to Early Cinema” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 41-42.

<sup>7</sup> Deac Rossell, “Exploding Teeth, Unbreakable Sheets, and Continuous Casting: Nitrocellulose, from Guncotton to Early Cinema” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 43-44.

Silent film production and use are typically dated to the dominant years from 1893 to 1929, while many films during this period prevailed the test of time, most have not, due to decay or being lost. Of all the silent films made in the U.S., 70 percent are believed to be lost.<sup>8</sup> Both foreign and American archives are currently home to the surviving silent films. According to film historian David Pierce, “the number of America’s silent feature films surviving in complete 35mm copies as originally released is a disappointingly low 14% (1,575 of 10,919 features).”<sup>9</sup> At the start of film archives, major motion pictures were prioritized for preservation, and therefore less famous silent films that had not produced a large profit, succumbed to decay or were lost.

David Pierce explains that there are numerous reasons why so many silent films were lost, including: poor storage that led to rapid decay, deliberate destruction due to legal reasons and/or perceived lack of commercial value, and other unknown reasons.<sup>10</sup> Furthermore, films were often made out of nitrate, which caused fires and decay. Many silent movie stars have had many of their feature films lost. A few lucky actors, such as Douglas Fairbanks, had all thirteen of his feature films from the 1920s survive. For Norma Talmadge, of her 48 feature films, only 28 survive in complete form.<sup>11</sup>

Metro-Goldwyn-Mayer (MGM) was the one major movie studios that properly cared for its films. According to David Pierce, “MGM invested in the preservation of those titles still in existence,” and therefore the studio ended up with the highest rate of silent film survival. Not all

---

<sup>8</sup>David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 1.

<sup>9</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 4.

<sup>10</sup> David Pierce, “The Legion of the Condemned - Why American Silent Films Perished,” *Film History* 9, no. 1 (1997), 5-7.

<sup>11</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 14.

film studios were like MGM; other studios contributed more loss than survival due to the lack of knowledge about how to care for the films or not having the funding to keep the films stored.<sup>12</sup>

Movie studio Columbia Pictures and two different producers were intentionally destroying silent films because of limited vault space and rising insurance costs.<sup>13</sup>

Pierce notes that a film's success was measured by the number of copies sold. A successful silent film has more of a chance of being saved with more surviving copies. A less successful silent film may result with no surviving copies as it was seen as having little value. Prints would end up in poor condition due to being repaired and being shown at multiple theaters. The remaining prints that had completed their circuit of theaters were destroyed to make money off the "silver content of the celluloid," which did not amount to more than a couple hundred dollars.<sup>14</sup> Other times, prints were destroyed "when a film was sold to another company for a remake" and legally had to be destroyed. Paramount Pictures sold the 1915 film *The Unknown* to Universal Studios.<sup>15</sup> The negative and all prints except one had to be destroyed. Paramount was allowed to keep one print for library purposes.

The cost of storage during the 1930s made it easier for owners to make the decision to remove those films that were no longer profitable. Moreover, the preservation of films was not a priority and staff would discard films at the first sign of decay. The most known significant factor contributing to silent films perishing is the nitrate material. The decaying nitrate film can

---

<sup>12</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 10-22.

<sup>13</sup> David Pierce, "The Legion of the Condemned - Why American Silent Films Perished," *Film History* 9, no. 1 (1997), 8.

<sup>14</sup> David Pierce, "The Legion of the Condemned - Why American Silent Films Perished," *Film History* 9, no. 1 (1997), 6.

<sup>15</sup> For additional information on Paramount Pictures history. "Paramount Pictures Corporation," *International Directory of Company Histories*, Ed., Steven Long, Derek Jacques, and Paula Kepos, Vol. 192, (Farmington Hills, MI: St. James Press, 2017), Business Insights: Essentials. For additional information on Universal Studios history. Mary Tradii, and Carrie Rothburd, "Universal Studios, Inc.," *International Directory of Company Histories*, Ed., Tina Grant, Vol. 100, (Detroit: St. James Press, 2009), 423-429, Business Insights: Essentials.

catch fire in a vault, spreading rapidly throughout the storage facility. Most films were lost this way.<sup>16</sup>

Not all movie studios were negligent when it came to the care of nitrate, Raymond Klune and Roger Mayer of MGM started a duplication program in 1960. Their program “led to the preservation of every film still surviving in the studio’s vaults—films from MGM and affiliated companies. Once preserved by the studio, the remaining nitrate masters were donated to George Eastman House<sup>17</sup> starting in 1965.”<sup>18</sup> It can be assumed that Klune and Mayer jump started the reassessment of the importance of silent films. Archives certainly understood the importance of silent era films, it was convincing the movie studios that took effort.

Starting in 1968, the efforts of the American Film Institute (AFI), funded by the National Endowment for the Arts, led to the placement of other studio nitrate collections with archives. The surviving Columbia Pictures and Warner Bros. silent negatives and Paramount prints came to the Library of Congress, along with the few surviving Universal silent features held by the studio.<sup>19</sup>

Fox nitrate films were given to the Museum of Modern Art and what was left of First National productions was brought to the George Eastman Museum and UCLA Film & Television Archive.<sup>20</sup>

Surviving silent films are housed in six major archives<sup>21</sup> across the U.S. and the George Eastman Museum is one of the primary holders. Films also ended up in private collections, many

---

<sup>16</sup> David Pierce, “The Legion of the Condemned - Why American Silent Films Perished,” *Film History* 9, no. 1 (1997), 6-13.

<sup>17</sup> The George Eastman Museum is formerly known as the George Eastman House. The name was changed in 2015.

<sup>18</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 6-7.

<sup>19</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 7.

<sup>20</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 7.

<sup>21</sup> Six archives housing surviving silent films: Library of Congress, George Eastman Museum, Museum of Modern Art, UCLA Film & Television Archive, American Film Institute, and the Academy Film Archive. David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 38.

of which were gifted to archives. The effort to find lost silent films now focuses on searching foreign archives and creating a “nationally coordinated program” to bring foreign-release prints back home.<sup>22</sup>

## Noteworthy Cinema

Newsreels, another important part of cinematic history, document and explain historical events that were broadcast on television.<sup>23</sup> Similar to silent films, newsreels were made on nitrate film stock and if stored poorly they will decay. Many archives donated their newsreels to the National Archives because they could no longer afford to care for the decomposing nitrate and did not want to risk fire. The first newsreels to enter the archive date back to World War I. The holdings of the National Archives consist of a multitude of news sources such as, *Paramount News*, *Fox Movietone News*, *Universal News*, and *The March of Time*.<sup>24</sup> The National Archives receive numerous “potential donations”; unfortunately, it is not possible to accept them all as the newsreels must meet certain criteria before being considered for acquisition. The lack of funds, storage space, and the high cost of preservation also makes the archives selective in what films they acquisition.<sup>25</sup> Two other major archives that collect newsreels are University of California, Los Angeles (UCLA) Film and Television Archive, which holds Hearst Metrotone News, and University of South Carolina, which holds Fox Movietone News.<sup>26</sup>

---

<sup>22</sup> David Pierce, *The Survival of American Silent Feature Films: 1912-1929* (Washington: Council on Library and Information Resources, 2013), 55-58.

<sup>23</sup> Anthony Slide, "Newsreel Preservation and The National Archives," In *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., 1992), 25-26.

<sup>24</sup> Anthony Slide, "Newsreel Preservation and The National Archives," In *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., 1992), 28.

<sup>25</sup> Anthony Slide, "Newsreel Preservation and The National Archives," In *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., 1992), 29.

<sup>26</sup> Anthony Slide, "Newsreel Preservation and The National Archives," In *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., 1992), 31.

Private ownership of newsreels caused issues in creating “an inclusive newsreel preservation program.” John E. Allen, Inc., from which the case study films came, was a private collector of newsreels. The collection consisted of “*Telenews* (1948-1954) and an incomplete run from the 1920s and early 1930s of *Kinograms*.”<sup>27</sup>

The purpose of donating newsreels to these major archives is to allow them to be preserved and made available for teaching and research by the public. Slide states, “government-produced film footage is in the public domain” and it is “available for outside use at cost.” Without the preservation of this footage, there would not be footage from which to learn. Like all other archives, the National Archives and UCLA Film and Television Archive lack proper funds to preserve everything in their collection. Newsreels may end up perishing just as silent films have. Newsreels are of equal importance to that of silent films or talking films but the funding to preserve them will be a continuing issue.<sup>28</sup>

Equally forgotten like most silent films, orphan films abandoned by their owner were “deemed, at one time or another, less valuable and disposable.”<sup>29</sup> It wasn’t until the early 2000s, similar to the 1960s for silent films, that orphan films were appreciated. Dan Streible started the “Orphan Film Symposium” in 1999, screening the neglected and forgotten orphan films.<sup>30</sup> Dan Streible is currently the Associate Director of New York University’s Moving Image Archiving and Preservation program.<sup>31</sup> Thanks to Streible for starting the Symposium, orphan films under “the discipline of film studies has begun to take notice of orphan films” and is being recognized

---

<sup>27</sup> Anthony Slide, “Newsreel Preservation and The National Archives,” In *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., 1992), 30-31.

<sup>28</sup> Anthony Slide, “Newsreel Preservation and The National Archives,” In *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., 1992), 25-30.

<sup>29</sup> Heide Solbrig, *Orphans No More: Definitions, Disciplines, and Institutions*, *Journal of Popular Film & Television* 37, no. 3 (2009), 100.

<sup>30</sup> Dan Streible, “The Role of Orphan Films in the 21st Century Archive” *Cinema Journal* 46, no. 3 (2007), 125.

<sup>31</sup> “Tisch Directory: Dan Streible,” NYU Tisch, accessed February 27, 2018, <https://tisch.nyu.edu/about/directory/cinema-studies/1324333861>.



as an important field of research, as Heide Solbrig states.<sup>32</sup> There is about an equal ratio of orphan films to Hollywood motion picture films at the Library of Congress where the films are available for study. In Solbrig's discussion of orphan films as a new field of research, she mentions that orphan films are described as "ephemeral, nontheatrical, educational, industrial, governmental, amateur, and sponsored." Each description is a genre of orphan films that is important for archives to preserve as they tell different types of stories, whether it be a social movement or an institution. The reason these genres of stories became orphan films is because at some point in time the owners could no longer be found, making preservation more difficult.<sup>33</sup>

Experimental filmmakers are finding a new use for orphan films and giving them a new purpose to tell a new story and give a different perspective on history.<sup>34</sup> Orphanista and experimental filmmaker such as the one Streible mentions, Gregorio Rocha, analyzes orphan films by interpreting them as scholars and archivists do to bring about an understanding the average person might not detect. In many cases, orphan films were decaying and could not be preserved due to copyright restrictions permitting them.<sup>35</sup> New York University student Emily Cohen, in her review of the work of experimental filmmakers Gregorio Rocha and Bill Morrison, talks about how Rocha and Morrison used unwanted and decaying orphan films to create a "revisionist reconstruction of the visual representation of history" using film preservation.<sup>36</sup> In

---

<sup>32</sup> Heide Solbrig, *Orphans No More: Definitions, Disciplines, and Institutions*, *Journal of Popular Film & Television* 37, no. 3 (2009), 100.

<sup>33</sup> Heide Solbrig, *Orphans No More: Definitions, Disciplines, and Institutions*, *Journal of Popular Film & Television* 37, no. 3 (2009), 100.

<sup>34</sup> Heide Solbrig, *Orphans No More: Definitions, Disciplines, and Institutions*, *Journal of Popular Film & Television* 37, no. 3 (2009), 99-102.

<sup>35</sup> Dan Streible, "The Role of Orphan Films in the 21st Century Archive" *Cinema Journal* 46, no. 3 (2007), 125-127.

<sup>36</sup> Emily Cohen, "The Orphanista Manifesto: Orphan Films and the Politics of Reproduction," *American Anthropologist* 106, no. 4, 2004, 723.

other words, Rocha and Morrison's analysis and interpretation, as well as accessibility, have forged a new history and narrative.<sup>37</sup>

This literature review has demonstrated the extent to which a majority of American film heritage has disappeared and is impossible to retrieve. To keep this from continuing, preserving all types of cinema is extremely important. Preserving every film that is decaying will not happen in a month or even five years.<sup>38</sup> The average costs of laboratory preservation mentioned by Anthony Slide date from 1992 and it can be concluded that due to the inflation of the value of the dollar, the average costs are much higher today, the average laboratory cost for a seven reel black and white film was approximately \$18,000, in 2010, compared to \$15,000 in 1992.<sup>39</sup> The amount of internal and external funding archives receive per year is only roughly equal to the cost of preserving one to two films a year. Film archives are tasked with caring for large quantities of films with such little money to do so.

In the next section, I discuss early and current preservation practices and how they relate to the case studies. The differences between preservation and conservation are clarified. To continue the discussion further, I will discuss how to care for the remaining films and what steps should be taken to do so leading into the introduction of the case studies.

---

<sup>37</sup> At the end of Cohen's review, she interviewed Rocha and asked if he ever experienced any issues with copyright. The filmmakers never ended up having issues with copyright because the films they used were on public domain. Many films are not this fortunate and continue to be restricted. Emily Cohen, "The Orphanista Manifesto: Orphan Films and the Politics of Reproduction," *American Anthropologist* 106, no. 4, 2004, 731.

<sup>38</sup> Almost every source I have read states that archives are in need of funding and, unfortunately, the funding they do receive only amounts to being able to preserve at the very least, one film per year. This applies since the beginning of film preservation.

<sup>39</sup> "Preservation Basics," in *National Film Preservation Foundation: Why Preserve Film?*  
<https://www.filmpreservation.org/preservation-basics>.

## Care and Preservation

### Early & Current Nitrate Preservation Practices

Making paper prints of early films was a copyright practice thought to have been a solution to deteriorating nitrate in 1901. Photographic bromide paper was used to transfer the image and then covered in paraffin. This was not the preferred method for preservation as it caused more problems to get the film from paper back to projectable film and the paper prints are extremely fragile.<sup>40</sup> In 1907, United States government technicians began storing film in a way that seems very strange today:

Films were placed, loosely rolled, in cans which had a space at the top and bottom into which sponges saturated with gelatin were inserted. The cans were then sealed shut with insulating tape, and it was claimed that under these conditions the films stayed in prime condition for long periods. ... Upon being removed from the cans were found to be as fresh looking, reliable, and in all other aspects as good as a freshly printed positive.<sup>41</sup>

This way of storing films is inconvenient if the films were to be inspected or viewed. In 1910, a more convenient way of storing film was suggested by Mr. W. M. Borradaile, a cinema-owner in Britain, he wanted to create a storage vault with temperature control.<sup>42</sup> It was realized then that films needed a cold place to be stored in order to have a long lifespan. Not every storage room or vault could keep constant temperature for nitrate films although fluctuating temperatures can be dangerous. Poor storage conditions cause chemical decay inside the film cans and can create a spontaneous combustion and result in devastating fires. For financial reasons, many nitrate films

---

<sup>40</sup> Stephen Bottomore, “‘A Fallen Star’: Problems and Practices in Early Film Preservation” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 185.

<sup>41</sup> Stephen Bottomore, “‘A Fallen Star’: Problems and Practices in Early Film Preservation” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 185-186.

<sup>42</sup> Stephen Bottomore, “‘A Fallen Star’: Problems and Practices in Early Film Preservation” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 186.

were thrown out, they were not seen as profitable long after the film was initially released. The films were sold or melted down for their silver content.

Conservation strategies during the 1930s and 1940s show slight progress in the way films were stored to prevent fires. Storage vaults were set at 59°F and 60-70% relative humidity, both the temperature and humidity are high considering what the standard is today.<sup>43</sup> The strategy focused on storage conditions, film inspection, and duplication (if the print was in poor condition).<sup>44</sup> The storage conditions during this time period did not guarantee a long-life span for the original negatives and once they decomposed to the point where copies could no longer be made, there was no chance in replacing the original.<sup>45</sup> When a new, safer and more stable, film base was introduced, cellulose triacetate, the idea of no longer caring for nitrate was proposed since it could be copied over to a stable film base. According to Jean-Louis Bigourdan, “preventing the decay of nitrate films was seen as a lost cause.”<sup>46</sup> Giving up on nitrate was not the answer but having proper storage conditions was.

To clarify the difference between preservation and conservation, I draw on the work of Paolo Cherchi Usai. He defines preservation as:

the overall complex of procedures, principles, techniques and practices necessary for maintaining the integrity, restoring the content, and organizing the intellectual experience of a moving image on a permanent basis. Duplication, restoration, conservation, reconstruction (when necessary), access and exhibition in proper conditions are all constituent parts of the preservation activity.<sup>47</sup>

---

<sup>43</sup> The environmental standards for paper records archives ranges from 35-65°F and a RH of 35-50%. Sarah S. Wagner, “Published Environmental Standards,” December 2000. [https://siarchives.si.edu/sites/default/files/pdfs/SummaryStorageStandards\\_0.pdf](https://siarchives.si.edu/sites/default/files/pdfs/SummaryStorageStandards_0.pdf).

<sup>44</sup> Jean-Louis Bigourdan, “From the Nitrate Experience to New Film Preservation Strategies” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 56-57.

<sup>45</sup> Jean-Louis Bigourdan, “From the Nitrate Experience to New Film Preservation Strategies” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 56.

<sup>46</sup> Jean-Louis Bigourdan, “From the Nitrate Experience to New Film Preservation Strategies” in *This Film is Dangerous: A Celebration of Nitrate Film* (Bruxelles: Federation internationale des archives du film, 2002), 57.

<sup>47</sup> Duplication is the set of practices related to the creation of a replica of the moving image, either as a backup of existing original or preservation components, or as a means to give access to the moving image. Restoration is the

Preservation involves all activities, whereas conservation is only a small part of the process. He defines conservation as:

the activities necessary to prevent or minimize the process of physical degradation of the archival artifact, whether such an artifact is newly produced by the archive (a preservation negative) or is an already existing object acquired by the institution, with possible signs of damage or instability.<sup>48</sup>

Part of these activities is placing films in a temperature and humidity-controlled vault and minimally interfering with the film.

Current preservation practices consist of both conservation and preservation; however, most nitrate cases only include conservation. This is because the film has decayed to the point where a copy cannot be made and/or preservation costs are not deemed to be worth it. The film Preservationists are attempting to save nitrate originals by making copies. They do this by “printing old film onto new, more stable film stock, storing the original film and new master under cool-and-dry conditions, and providing public access through surrogate video, DVD, and film copies.”<sup>49</sup> This is only possible depending on the condition of the nitrate films.

The current preservation practices described relate to the case studies in that each of the films have reached a point where previous decay has prevented the opportunity to make copies of the films. Each film has a high level of image loss, large sections of titles and images are unrecognizable. The cost would be too great to do further preservation. Prior to the film

---

set of technical, editorial and intellectual procedures aimed at compensating for the loss or degradation of the moving image artifact, thus bring back to a state as close as possible to its original condition. Reconstruction is the editorial process through which a print whose appearance is as close to a desired version, considered as authoritative, is created by interpolating, replacing or reassembling segments within the copy and with footage retrieved from other copies. Paolo Cherchi Usai, “Ethics of Film Preservation” in *Silent Cinema: An Introduction*, (London: BFI, 2010), 66.

<sup>48</sup> Cherchi Usai, “Ethics of Film Preservation” in *Silent Cinema: An Introduction*, (London: BFI, 2010), 66.

<sup>49</sup> “Preservation Basics,” *National Film Preservation Foundation: Why Preserve Film?*  
<https://www.filmpreservation.org/preservation-basics>.

collection's arrival to GEM, they were housed at John E. Allen Cinema Arts Laboratory. John E. Allen was storing the films at his lab under poor storage conditions. The collection was donated to GEM in 1975 but had to continue to be stored offsite under poor conditions until the GEM could build a proper facility to house the nitrate films. The films were brought to the nitrate vaults in 1995 and are located at the Louis B. Mayer Conservation Center in Chili, NY, which is operated by GEM.<sup>50</sup> The first inspection condition reporting of the film collection was done in 2000.

### Caring for the Remaining Films

Older films, especially silent films, will have endured some type of damage during their lifetime. To remediate this damage, archivists conserve each frame of a film by repairing and preventing further damage. A clean work area is the first step to inspecting a film along with wearing cotton gloves for handling. Any dirt, dust, mold or foreign objects, such as plastic bags and paper can further harm the film. According to Paul Read and Mark-Paul Meyer, "flat bed winders" are the best for inspecting a film, as the speed can be controlled and will cause fewer issues for the film.<sup>51</sup>

Knowing how to identify a film reel can be beneficial in locating lost films. The first step is to look over the film can and look for a label if there is one, which can give away possible dates the film was made depending on its distributor. Checking the film edges before unwinding can determine whether the film is black and white or color; this information can create a date range. While going through the film, the leader will possibly have the title of the film written on

---

<sup>50</sup> Deborah Stoiber, personal conversation with author, January, 2018.

<sup>51</sup> Paul Read and Mark-Paul Meyer, "Film Damage, Repair and Preparation," In *Restoration of Motion Picture Film* (Oxford, England: Butterworth-Heinemann, 2000), 84.

it. Leader is blank film placed at the head and tail of a film used to protect the main film and to aid in threading the film through a projector. If there is no title on the leader, it is possible to look for words in scenes such as on a building or a sign; also, if an actor can be recognized, this can aid in identifying the film. To tell if a film is silent or not, look for intertitles, which are printed dialogue or narration shown in between scenes. Many early films would include the title or production company information in the intertitle.

Identifying the edge code of the film, if visible, using the “Eastman Kodak Date Code Chart” will tell the year the print was made. Another way to date films is to look for marks used by production companies at the start of filmmaking. The markings were only used for “the first 20 years” but can be helpful in identifying early silent films.<sup>52</sup>

Film shrinkage, one of the most common issues of older films, is caused by storage conditions not having enough humidity and/or the condition of the film stock itself. Shrinkage can be measured and monitored with shrinkage gauges. With shrinkage comes brittleness as well, both caused by a “loss of moisture.” Like any other older film, it could have scratches, drying marks which is the “uneven drying of emulsion,” dirt and mold. Almost all damage done to perforations and edges of a film can be repaired using tape, which is the most common fix, or using a specialized glue called film cement, considered “good archival permanence.” Looking at splices (a cut made in the film when editing or could be a result of a tear) is a good way of dating a film and knowing what type of material the stock is. Nitrate and acetate film stock can hold cement and tape splices, while polyester film stock can only hold tape or ultrasonic splices, when

---

<sup>52</sup> Paul Read and Mark-Paul Meyer, "Identification of Archive Film and Interpretation of Historical Data," in *Restoration of Motion Picture Film* (Oxford, England: Butterworth-Heinemann, 2000), 53-60.

the film is melted together with sound waves.<sup>53</sup> The last type of damage that is repairable is the growth of “fungus and bacteria” and this can be removed by washing the film with chemicals specifically for this purpose.<sup>54</sup> However, once the mold has eaten the emulsion, the emulsion will not reappear.

After the initial inspection and before being sent to a laboratory for copying onto newer stock, an archive can ensure their storage is up to code to keep films from decaying further before and after preservation. According to the National Film Preservation Foundation, the average nitrate film archive should have their storage vaults set at 32°F and a relative humidity between 30% and 50%, with their films placed on shelves and not near the floor or near anything that will create heat.<sup>55</sup> It is important to have the films off of the floor and on shelves to allow for air exchange.

The vaults have fresh air exchange every 20 minutes. This exchange allows for off-gassing from the films to be removed as quickly as possible. When nitrate decomposes, this off-gas can spread in the vaults, causing other films to decay. Getting rid of those gasses allows us (Louis B. Mayer Conservation Center) to store ‘bad’ nitrate with ‘good’ nitrate and prevents further decay to the films.<sup>56</sup>

The preservation costs of a black and white film at a laboratory could be upwards of \$18,000 per film, based on an average from 2010.<sup>57</sup> The combination of the primary labor involved and the use of temperature-controlled storage vaults, conjure up the highest cost for preservation. The preservation of color film had to be considered due to the quickly fading

---

<sup>53</sup> Nitrate and polyester film were both used around the same time frame, the early 20th century. Polyester was not invented until 1955. Nitrate film was discontinued by 1951 but the use of acetate and polyester is still used today. <https://www.nps.gov/museum/coldstorage/pdf/2.3.1a.pdf>.

<sup>54</sup> Paul Read and Mark-Paul Meyer, "Identification of Archive Film and Interpretation of Historical Data," in *Restoration of Motion Picture Film* (Oxford, England: Butterworth-Heinemann, 2000), 85-97.

<sup>55</sup> “Storage,” *The Film Preservation Guide: The Basics for Archives, Libraries, and Museums* (San Francisco, CA: National Film Preservation Foundation, 2004), 60.

<sup>56</sup> Deborah Stoiber, email with author, March 5, 2018.

<sup>57</sup> “Preservation Basics,” *National Film Preservation Foundation: Why Preserve Film?* <https://www.filmpreservation.org/preservation-basics>.



properties of Eastmancolor film produced from the 1950s to the mid-1970s. The rate of fading of an Eastmancolor film with poor storage is five years but with proper storage, a film can last without fading for ten or more years. Based on an average from 2014, the cost of preserving a twelve-reel color film can amount to \$34,000.<sup>58</sup> The high costs allow archives to preserve only a few films per year. Archivist and film historian Anthony Slide points out that, “the average grant from the National Endowment for the Arts<sup>59</sup> to an American film archives is little more than \$100,000 a year.” Whether its black and white or color film the high concern for preservation will be the same due to a continuous lack of funds.<sup>60</sup>

## Case Studies

The case study for this thesis focus consists of early 20<sup>th</sup>-century nitrate prints originally stored at the John E. Allen lab before the building of the Louis B. Mayer Conservation Center, which is owned and operated by the George Eastman Museum. Four prints were selected based on their varying levels of decay that were documented in 2000 and knowing these prints are not feature films but orphan films. Being that they are orphan films, they make for a better case as to why saving all nitrate is necessary. Each print format is 35mm and silent. The methodology consists of inspecting the titles reel by reel and comparing the decomposition levels from 2000 to the present in an effort to determine the extent to which the storage conditions have slowed the rate of decomposition. The group of films represent both similar and different aspects of

---

<sup>58</sup> “Color Negative & Color Positive Services,” ColorLab, February 2014.

<https://web.archive.org/web/20131220081713/http://www.colorlab.com:80/pricelist/>

<sup>59</sup> Additional funders of film preservation include but are not limited to the Institute for Museum and Library Services (IMLS), National Film Preservation Foundation (NFPF), Council on Library and Information Resources (CLIR), and the National Endowment for the Humanities (NEH).

<sup>60</sup> Anthony Slide, “New Areas of Preservation,” in *Nitrate Won't Wait: A History of Film Preservation in the United States* (Jefferson, NC: McFarland & Company, Inc., Publishers, 1992), 104-106.

decomposition being that the levels are similar reel to reel under one title but slightly vary from one title to the next. A table found in appendix A, lists the four case studies in a condensed analysis of differences in decomposition levels between the films from 2000 to 2018. The five stages of decomposition according to the International Federation of Film Archives (FIAF) are as follows:

1. The silver image becomes faded and there is a brownish discoloration of the emulsion. The colors fade, and a loss of balance between the colors occurs.
2. The emulsion becomes sticky.
3. There is a partial softening of the emulsion (formation of “honey”<sup>61</sup>); it becomes blistered and emits a pungent odor.
4. The entire film congeals into one solid mass.
5. The film base disintegrates into a brownish powder, giving off an acrid smell.<sup>62</sup>

Before inspection, I reviewed the most-recent inspection reports that were completed in 2000 to prepare myself to inspect for decomposition and damage. No other inspections were done on these films previous to 2000. While going through each film reel, I continued to compare my own inspection to the previous one. I determined whether there is new decay or any new damage such as a broken splice, edge tears, worsened brittleness, new blisters, broken perforations, or increased shrinkage. The storage conditions should have stabilized the film, which is what I am expecting to see.

To undertake the process of inspection, the selected films are pulled from the vault at the conservation center and put in a staging room for 24 hours to acclimate to room temperature and then can be brought into the inspection room. The temperature of the vaults is set at 40°F

---

<sup>61</sup> When the base of the film starts to decompose, nitric acid is formed. “The acid initiates a digestion reaction of the cellulose in the film base which breaks down the cellulose into sugar-like compounds.” This creates the sticky honey found on nitrate. In most of the case studies not all the honey was removed and is left on the film but is no longer sticky, it has hardened. “Base Polymers,” National Film and Sound Archive of Australia, accessed March 1, 2018, <https://www.nfsa.gov.au/preservation/guide/handbook/base-polymers>.

<sup>62</sup> FIAF, *A handbook for film archives*, (Brussels: FIAF Secretariat, 1980), 18-19.

<http://www.fiafnet.org/images/tinyUpload/Publications/FIAF-Bookshop/A-Handbook-for-Film-Archives-LR.pdf>.

30%RH, the staging room is set at 55°F 35%RH, and the inspection room is set at 68°F 20%RH. The inspection room RH is too dry for the films, but GEM is currently working on a solution.<sup>63</sup> The inspection of the films was done with the guidance and instruction of GEM's Collection Manager, Deborah Stoiber. The GEM follows particular standards in terms of inspecting and handling nitrate. A clean film bench must be prepared, and a pair of gloves should be worn for handling the film to prevent fingerprints on the film and to avoid dirt from hands. Open the film can away from you and visually inspect the film. Carefully place the film on the inspection bench and begin winding through slowly. The shrinkage should be measured three times: at the beginning, middle and end of the reel. The highest amount of shrinkage is recorded. The edge code can be located on the edge periodically throughout the film; it should be recorded on the inspection form. The footage can be estimated with a footage stick and written in square brackets for cataloging purposes. Any damage and broken splices should be recorded. When inspection is complete, the inspector signs their initials and dates an inspection sticker fastened on the leader to keep the film from unwinding. All documentation is done on inspection forms with every field filled out in neat handwriting for others to read (see figure 1 in appendix B).

### Historical Importance Based on Producer

*Garden of Allah*, 1916, was produced by Selig Polyscope Co.,<sup>64</sup> founded in 1896.<sup>65</sup> Selig was targeted for patent infringement by the Edison Company like many other small production

---

<sup>63</sup> Deborah Stoiber, email with author, March 5, 2018.

<sup>64</sup> AFI Catalog of Feature Films, Accessed April 22, 2018, <https://catalog.afi.com/Catalog/Showcase>.

<sup>65</sup> "Studio History," Selig Polyscope Company, Accessed April 22, 2018, <http://seligpolyscope.com/about/studiohistory/>.

companies at the time.<sup>66</sup> Thomas Edison was attempting to gain control over the motion picture industry. Edison formed the Motion Picture Patents Company in 1909 as “a holding company for the patents belonging to all the producers.” The company “issued licenses, on the payment of royalties, to producers, distributors and exhibitors.”<sup>67</sup> The company had gained control over the film industry so much that they would sue production companies and tactfully get them to agree to become part of the Motion Picture Patents Company. This unfortunate situation occurred in 1907 when the Selig Polyscope Co. in 1907 became officially considered a “charter member of the Patents Company.”<sup>68</sup> Even as part of the Motion Picture Patents Company, Selig managed to produce a sizable number of full-length feature films and short films between 1913 and 1917.<sup>69</sup> *Garden of Allah* is one of the full-length feature films that Selig produced in 1916.

*Plain Jane (The Hick)*, 1916, was produced by Kessel and Bauman and New York Motion Picture Company.<sup>70</sup> This film was “re-edited and reissued as *The Hick* in 1920.”<sup>71</sup> Film producers Kessel and Bauman were part of the New York Motion Picture Company when it was formed in 1909. Kessel and Bauman were also targeted, like Selig Polyscope Co., by the Motion Picture Patents Company for their camera to which Edison’s patent “held exclusive rights.”<sup>72</sup> They continued filming with the camera unafraid of Edison’s claims. The New York Motion Picture Company managed to produce a generous amount of feature films before the company

---

<sup>66</sup> Eileen Bowser, *History of the American Cinema: The Transformation of Cinema 1907-1915*, (New York, NY: Macmillan Publishing Co., 1990), 22.

<sup>67</sup> Eileen Bowser, *History of the American Cinema: The Transformation of Cinema 1907-1915*, (New York, NY: Macmillan Publishing Co., 1990), 29.

<sup>68</sup> Gene Fernet, “Selig Polyscope,” *American Film Studios: An Historical Encyclopedia*, (Jefferson, NC: MacFarland, 1988), 212.

<sup>69</sup> Gene Fernet, “Selig Polyscope,” *American Film Studios: An Historical Encyclopedia*, (Jefferson, NC: MacFarland, 1988), 213.

<sup>70</sup> AFI Catalog of Feature Films, Accessed April 22, 2018, <https://catalog.afi.com/Catalog/Showcase>.

<sup>71</sup> AFI Catalog of Feature Films, Accessed April 22, 2018, <https://catalog.afi.com/Catalog/Showcase>.

<sup>72</sup> Gene Fernet, “The New York Motion Picture Company,” *American Film Studios: An Historical Encyclopedia*, (Jefferson, NC: MacFarland, 1988), 151.

died out in 1917.<sup>73</sup> *Plain Jane (The Hick)* was one of the feature films the company produced right before the company dissolved.

*Call of Her People*, 1917, produced by Columbia Pictures Corp.<sup>74</sup> or Cohn-Brandt-Cohn (C.B.C.) Film Sales Corporation, was founded in 1920 on what was called “Poverty Row.” Columbia Pictures Corp. did not release a feature film until 1922, having previously released non-feature films. The name of the studio changed to Columbia Pictures in 1924. C.B.C. did not have a permanent studio starting out: they operated out of offices and rented studio space only when filming a picture.<sup>75</sup> *Call of Her People* was a feature film produced in 1917, because one of the founders, Jack Cohn, was producing films before he entered a partnership with Joseph Brandt and his brother Harry Cohn. Jack Cohn was associated with Carle Laemmle’s Independent Moving Pictures Company (IMP) before C.B.C. and IMP was founded in 1909, which also faced challenges with the Edison Company.<sup>76</sup>

*Carmen (Gypsy Blood)*, 1918, was produced by Projektions-AG Union (PAGU) a German film production company in Berlin that was founded in 1910.<sup>77</sup> The Edison Company was not only trying to gain control of the American film industry but also control the European distribution of film to America as well. Edison was targeting the production company Pathé Frères in France,<sup>78</sup> which led to distribution from other countries such as Germany, which resulted in PAGU distributing to the United States. *Carmen* was re-issued as *Gypsy Blood* when

---

<sup>73</sup> Gene Fernet, “The New York Motion Picture Company,” *American Film Studios: An Historical Encyclopedia*, (Jefferson, NC: MacFarland, 1988), 154.

<sup>74</sup> AFI Catalog of Feature Films, Accessed April 22, 2018, <https://catalog.afi.com/Catalog/Showcase>.

<sup>75</sup> Gene Fernet, “Columbia Pictures,” *American Film Studios: An Historical Encyclopedia*, (Jefferson, NC: MacFarland, 1988), 41.

<sup>76</sup> Eileen Bowser, *History of the American Cinema: The Transformation of Cinema 1907-1915*, (New York, NY: Macmillan Publishing Co., 1990), 74.

<sup>77</sup> Thomas Elsaesser, Michael Wedel, Ed., *A Second Life: German Cinema’s First Decades*, (Amsterdam University Press, 1996), 87.

<sup>78</sup> Eileen Bowser, *History of the American Cinema: The Transformation of Cinema 1907-1915*, (New York, NY: Macmillan Publishing Co., 1990), 23.

it was shown in the States. It is not clear if *Carmen* (Gypsy Blood) was a feature film as it came from Germany.

These films are particularly compelling cases for conservation because they were produced during a controversial time when control over the film industry was in question and one company was attempting to dominate. Producers wanted free rein to be their own company, but the Edison Company was ensuring that did not happen.

### *Garden of Allah* [1916]

Before inspecting the *Garden of Allah*, I reviewed and followed the inspection standards to reduce the risk of damage to the print. The inspection done in 2000 noted the decomposition at level three for every reel except reel two, which was at level two decomposition. Level two indicated that the emulsion had become sticky and level three signaled that blisters are visible on the surface. The blisters were popped when the reels were last inspected. When I visually inspected each reel, I found there no new blisters had formed. The emulsion was visibly sticky, putting each reel at level two decomposition. I filled out an inspection form as I went through each reel making note of the edge code and checking the shrinkage. If there were any new damage and/or decomposition those were noted along with the footage where it was located. Any broken splices were not fixed, as repairs are not done during conservation. On the inspection form I took note of the amount of emulsion and base scratches, repaired and not repaired damage, oil and dirt, fading, warpage, and decomposition level. I continuously compared the inspection done in 2000 to my own, not wanting to miss anything new or old.

Upon opening the film cans, there is a strong aroma that comes from decaying nitrate and what has been described to me as a “wet dog wearing dirty gym socks.”<sup>79</sup> The shininess of sticky emulsion is highly visible on each reel (see figure 2 in appendix B). While going through the film, the decay was evident, the blisters were visible, and there was partial to 100% image loss in large sections (see figures 3 and 4 in appendix B). In some images there were remnants of film tinting. A fair amount of the decomposition was present at splices which were done with cement, and the chemicals in the cement caused the decay. Brittleness caused small particles of film to fall off continuously. There were tinted and toned sections of almost every reel, otherwise the film was black and white (see figures 5 and 6 in appendix B). Reel two had a broken splice which was documented and then I continued inspection, because conservation does not repair. In sections where the image is not completely lost, the intertitles are readable as well as the opening credits (see figures 7, 8, and 9 in appendix B). The shrinkage of each reel was not significantly different from the shrinkage documented in 2000. This also applies to scratches, damage, fading and warpage. These aspects are rated on a scale of 1 to 4. 1 is slight, 2 is fair, 3 is moderate and 4 is heavy. The print had consistent moderate scratches, slight perforation damage that had been repaired and had not been repaired. Repaired edge damage was moderate and what was not repaired was fair. There were no signs of oil, dirt, or fading. The warpage was consistently fair. The only real change was the level of decomposition from level three to two.

The *Garden of Allah* contributes to this thesis by showing the extent to which the storage conditions in the nitrate vaults at the conservation center has slowed decomposition. In 2000 the film was rated at a level three decomposition. The film had become soft in parts and had the formation of honey, which was removed. There was also the formation of blisters that popped

---

<sup>79</sup> Deborah Stoiber, personal conversation with author, January 18, 2018.

when the film was wound through. Since 2000, no new blisters or honey have formed; the film is now rated at level two decomposition. There is only visible emulsion stickiness. The storage conditions have considerably slowed the decomposition process, extending the lifespan of the print. There are no conservation matters remaining, the broken splice and any edge damage would be done by a lab.

The amount of discoloration and image loss throughout the reels makes this print not worthy of copying, but it can be used for research. There is enough information in many of the images and intertitles to be used. I would also like to note that this copy of *Garden of Allah* is incomplete. The sixth reel was destroyed in 2000 due to the level of decomposition and it was not properly documented at the time. If the public were aware of the importance of nitrate originals at the time this film was produced, it may not have suffered so greatly in poor storage conditions prior to its arrival at the George Eastman Museum. Creating awareness today could still save many nitrate films.

### *Plain Jane (The Hick) [1916]*

*Plain Jane* is a five-reel positive film. The inspection done in 2000 notes each reel at varying stages of decomposition, one being the lowest and the highest at stage three. While inspecting the film, I noticed a common theme with each reel. The inspection done in 2000 makes note of “projector oil on film” and “white clouding” but during inspection I found what was mistaken for projector oil was ferrotyping (see figure 10 in appendix B) and what was white clouding is mold (see figures 11 and 12 in appendix B). Ferrotyping and projector oil can look a lot alike, except projector oil rubs off when touched and ferrotyping does not. Ferrotyping looks like shiny spots on the film and it “occurs when the emulsion is pressed very hard against adjacent layers of film



in a film pack. This pressure can be brought about by a tightly wound film swelling due to exposure to higher % relative humidity (RH) or due to films shrinking over time.”<sup>80</sup> Ferrotyping in *Plain Jane* was consistent throughout the film of each reel. The image loss was consistent to what was noted in 2000, it ranged from 30% to 100% depending on the reel but there was no new image loss. The shrinkage was previously noted as over 2% but it is unknown how much over 2% the shrinkage was compared to the percentages of shrinkage I measured during the inspection, which averaged around 2.5%.

The edges of the film for every reel were brittle, small pieces were consistently falling off (see figure 13 in appendix B). Having the pieces come off while reeling through the film is considered to be good that way the brittle decomposition comes off and will not affect the film further. The same damage noted in 2000 was apparent in the current inspection. During inspection of reel one, a previously damaged edge was caught on my cotton glove and the film was torn through the frame and is currently holding on by one edge (see figure 14 in appendix B). This could have happened to anyone going through the film, especially when in conservation damage is not repaired. The tinting of the film was moderately faded just as any color film would be if it were over 100 years old. Each reel had a different decomposition stage in 2000, reel one was at stage one, reel two was at stage two, reel three was at stage one, and reels four and five were both between stages two and three. After my inspection, I considered the reels to all be at stage one decomposition. The image loss decomposition had not gotten worse, any weak splices were not broken and there was no new formations of honey or mold.

---

<sup>80</sup> Deborah Stoiber, “Frequently Asked Questions: Nitrate Film Inspection (Decomposition),” 2008, 4.

## *Call of Her People [1917]*

*Call of Her People* is a six-reel negative film. The film has two different edge codes. The image sections have an edge code dated earlier than the title sections. This occurred for the reason that the titles were added later and may have not been chemically processed as well as the image, causing decay. The titles suffered the most image loss with large sections of up to 100% loss. This was a pattern on every reel and was also noted in the 2000 inspection. Reels two and four have visible crystallization<sup>81</sup> on top of the reel which was most likely left over from the initial inspection (see figure 15 in appendix B). Each reel has moderate to heavy amounts of edge and perforation damage. There is a moderate amount of ferrotyping throughout every reel. Reels three and four have small sections of hardened honey which caused image loss (see figures 16 and 17 in appendix B). The shrinkage measurement was not written down for reels one and two during the 2000 inspection, but when it was indicated, it is noted as over 2% for the remaining of the reels. This absence of information makes it impossible to determine whether the shrinkage has improved or declined. The warpage of the film is considered to be moderate but was not recorded in 2000.

The decomposition stages of the film depended on the film stock. The titles had the most decomposition which put it at level three. The images were in good quality and the decomposition levels ranged from zero to one. After my own inspection, I averaged the decomposition level of each reel to be a level two. The image loss has stabilized and has not

---

<sup>81</sup> “These crystals are the plasticisers forced out of the base by a change in the acid content of the base. Analysis has shown that these crystals are mainly triphenyl phosphate (TTP).” “Base Polymers,” National Film and Sound Archive of Australia, Accessed March 1, 2018, <https://www.nfsa.gov.au/preservation/guide/handbook/base-polymers>.

spread further into the image film stock. There is also no new damage that has arisen that was not already recorded in the previous inspection.

### *Carmen (Gypsy Blood) [1918]*

*Carmen* is also a six-reel film. Similar to *Plain Jane*, *Carmen* has two different film stocks: the English titles were added in later for the U.S. release version. The image stock on every reel is in relatively good condition except for moderate fading of each color of tint, sepia, green, red and blue. The titles had the most severe damage with large sections of 100% image loss. A common occurrence was for the image loss to carry into the image sections for about five to ten frames. Ferrotyping was consistent throughout each reel and there are multiple sections with hardened honey. The shrinkage measurement was over 2% on almost every reel but it is undeterminable if the shrinkage is better or worse from the previous inspection. Each reel had a different level of warpage from fair to heavy. The damage is consistent with the previous films, weak splices, edge tears, broken perforations and splices, and hardened honey.

The current level of decomposition for reels one, four, five and six is level two, and for reels two and three the level is between one and two. The previous inspection recorded the decomposition at around level three for each reel. Even with honey in most sections on the reels, it has not affected the film any further after being in conditions cold enough for it to harden. There has been no further image loss, edge damage or perforation damage recorded.

### **Findings and Analysis**

Under proper storage conditions at the Louis B. Mayer Conservation Center, the vaults set at 40°F 30%RH are preventing nitrate film from further deterioration. Each case study that

was inspected in 2000 is currently one decomposition level lower than previously documented. This is not to say that the film has reverted back to a lower level of decomposition on its' own while sitting in storage. The earlier inspection removed decomposition such as film blisters and honey and, in my inspection, there was no evidence of new blisters or honey formed constituting the decomposition level to be lower than before. The shrinkage measurements were not accurately written down for many of the films and it cannot be concluded whether the current storage conditions have increased or decreased the films shrinkage. The visible decay left on the films includes sections with hardened honey, brittle edges that flake off, crystallization that showed up on a few reels but not all, brown decomposition that appeared at splices and on perforations, image loss, and ferrotyping.

No further conservation matters remain for the films, if damage was to be repaired and/or should a copy need to be made it would be done by a lab. Based on the amount of image loss of each title and the weakness of almost all the splices, it would be difficult to make copies of any of the films. Repairs could be made but as of now, the film prints are ideal for research based on their intertitles, tints, and shooting of the image scenes.

## **Conclusion**

Silent films are an immense part of our cinematic history, they are their own art form. Before this art form disappears, it must be conserved under the right conditions. Average costs for the preservation of nitrate film, make a preservationist's job difficult when trying to preserve and save all the nitrate he or she can. If conservation is the only route to take due to the level of decay of most films, conserving what is left can be beneficial to researchers even if a copy cannot be made. The films of the John E. Allen Collection are one of many collections to have

been stored in non-archival conditions for a long period of time, before coming to Louis B. Mayer Conservation Center. With the amount of nitrate produced during its heyday, there is sure to be more nitrate film being stored by private collectors under non-archival conditions. For the film being currently stored in archives under proper conditions, there are more films that can be inspected at present. The current nitrate vault statistics of the Louis B. Mayer Conservation Center states the number of reels that need to be inspected amount to 1,676 reels out of a total of 24,100 reels.<sup>82</sup> Inspecting film titles takes significant time, effort, and resources. The public is often not currently aware of this situation and continuing to raise awareness could save many nitrate films. I feel there is hope for nitrate films considering that while public awareness of nitrate grows, the consistency of conservation at the George Eastman Museum will keep the films surviving under the best optimal storage conditions so that they will be here for future generations. Thus, this work will pay off in the long run.

---

<sup>82</sup> “Current Nitrate Vault Statistics,” Louis B. Mayer Conservation Center, January, 2018.

## Bibliography

- AFI Catalog of Feature Films. Accessed April 22, 2018.  
<https://catalog.afi.com/Catalog/Showcase>.
- Bigourdan, Jean-Louis. "From the Nitrate Experience to New Film Preservation Strategies" In *This Film is Dangerous: A Celebration of Nitrate Film*. Bruxelles: Federation internationale des archives du film, 2002. 52-71.
- Bottomore, Stephen. "'A Fallen Star': Problems and Practices in Early Film Preservation" In *This Film is Dangerous: A Celebration of Nitrate Film*. Bruxelles: Federation internationale des archives du film, 2002. 185-189.
- Bowser, Eileen. *History of the American Cinema: The Transformation of Cinema 1907-1915*. New York: Macmillan Publishing Co., 1990. 29.
- Cohen, Emily. "The Orphanista Manifesto: Orphan Films and the Politics of Reproduction." *American Anthropologist* 106, no. 4, 2004. 719-31.
- ColorLab. "Color Negative & Color Positive Services." February, 2014.  
<https://web.archive.org/web/20131220081713/http://www.colorlab.com:80/pricelist/>
- Elsaesser, Thomas., Wedel, Michael., Ed., *A Second Life: German Cinema's First Decades*. Amsterdam University Press, 1996. 87.
- Fernett, Gene. *American Film Studios: An Historical Encyclopedia*, Jefferson, NC: MacFarland, 1988. 22-154.
- FIAF. *A handbook for film archives*. Brussels: FIAF Secretariat, 1980. 18-19.  
<http://www.fiafnet.org/images/tinyUpload/Publications/FIAF-Bookshop/A-Handbook-for-Film-Archives-LR.pdf>.
- Louis B. Mayer Conservation Center. "Current Nitrate Vault Statistics." January, 2018.
- National Film and Sound Archive of Australia. "Base Polymers," Accessed March 1, 2018.  
<https://www.nfsa.gov.au/preservation/guide/handbook/base-polymers>.
- NYU Tisch. "Tisch Directory: Dan Streible." Accessed February 27, 2018.  
<https://tisch.nyu.edu/about/directory/cinema-studies/1324333861>.
- "Paramount Pictures Corporation." International Directory of Company Histories, Ed. Steven Long, Derek Jacques, and Paula Kepos. Vol. 192. Farmington Hills, MI: St. James Press. 2017. Business Insights: Essentials.
- Pierce, David. *The Survival of American Silent Feature Films: 1912-1929*. Washington: Council on Library and Information Resources, 2013. 1-73.

[https://www.loc.gov/programs/static/national-film-preservation-board/documents/pub158.final\\_version\\_sept\\_2013.pdf](https://www.loc.gov/programs/static/national-film-preservation-board/documents/pub158.final_version_sept_2013.pdf).

——— “The Legion of the Condemned - Why American Silent Films Perished.” *Film History* 9, no. 1, 1997. 5-22.

“Preservation Basics.” *National Film Preservation Foundation: Why Preserve Film?*  
<https://www.filmpreservation.org/preservation-basics>.

Read, Paul, and Mark-Paul Meyer. "Identification of Archive Film and Interpretation of Historical Data." In *Restoration of Motion Picture Film*. Oxford: Butterworth-Heinemann, 2000. 53-68.

——— “Film Damage, Repair and Preparation.” In *Restoration of Motion Picture Film*. Oxford: Butterworth-Heinemann, 2000. 83-104.

Rossell, Deac. “Exploding Teeth, Unbreakable Sheets, and Continuous Casting: Nitrocellulose, from Guncotton to Early Cinema” In *This Film is Dangerous: A Celebration of Nitrate Film*. Bruxelles: Federation Internationale des Archives du Film, 2002. 37-47.

Slide, Anthony. "Newsreel Preservation and The National Archives." In *Nitrate Won't Wait: A History of Film Preservation in the United States*. Jefferson, NC: McFarland & Company, Inc., Publishers, 1992. 25-35.

——— "New Areas of Preservation." In *Nitrate Won't Wait: A History of Film Preservation in the United States*. Jefferson, NC: McFarland & Company, Inc., Publishers, 1992. 102-121.

Solbrig, Heide. “Orphans No More: Definitions, Disciplines, and Institutions.” *Journal of Popular Film & Television* 37, no. 3, 2009. 98-105.

Stoiber, Deborah. Collections Manager. George Eastman Museum. Email and personal conversation. January-March, 2018.

——— “Frequently Asked Questions: Nitrate Film Inspection (Decomposition).” 2008. 1-4.

“Storage.” In *The Film Preservation Guide: The Basics for Archives, Libraries, and Museums*. San Francisco, CA: National Film Preservation Foundation, 2004. 59-69.

Streible, Dan. “The Role of Orphan Films in the 21st Century Archive.” *Cinema Journal* 46, no. 3, 2007. 124-128.

Tradii, Mary, and Carrie Rothburd. "Universal Studios, Inc." *International Directory of Company Histories*, Ed., Tina Grant, Vol. 100. Detroit: St. James Press, 2009. 423-429. *Business Insights: Essentials*.

Usai, Paolo Cherchi. "Ethics of Film Preservation" In *Silent Cinema: An Introduction*. London: BFI, 2010. 44-76.

Wagner, Sarah S. "Published Environmental Standards." December 2000.  
[https://siarchives.si.edu/sites/default/files/pdfs/SummaryStorageStandards\\_0.pdf](https://siarchives.si.edu/sites/default/files/pdfs/SummaryStorageStandards_0.pdf)



## Appendix A

Case Studies	Date	Level of Decay 2000	Incomplete/complete	# of reels	Current level of decay 2018	Date of inspection
<i>Garden of Allah</i>	1916	Reel 1: 3 Reel 2: 3 Reel 3: 2 Reel 4: 3 Reel 5: 3	Incomplete (6 <sup>th</sup> reel destroyed)	5	Reel 1: 2 Reel 2: 2 Reel 3: 2 Reel 4: 2 Reel 5: 2	1/29/18 1/29/18 1/29/18 1/29/18 2/5/18
<i>Plain Jane (The Hick)</i>	1916	Reel 1: 1 Reel 2: 2 Reel 3: 1 Reel 4: 2-3 Reel 5: 2-3	Complete	5	Reel 1: 1 Reel 2: 1 Reel 3: 1 Reel 4: 1 Reel 5: 1	2/6/18 2/6/18 2/6/18 2/6/18 2/6/18
<i>Call of Her People</i>	1917	Reel 1: 2-3 Reel 2: 1, 3 Reel 3: 0, 3 Reel 4: 0, 3 Reel 5: 1, 3 Reel 6: 1, 3	Complete	6	Reel 1: 2 Reel 2: 2 Reel 3: 2 Reel 4: 2 Reel 5: 2 Reel 6: 2	2/12/18 2/12/18 2/12/18 2/12/18 2/12/18 2/12/18
<i>Carmen (Gypsy Blood)</i>	1918	Reel 1: 3 Reel 2: 0-1, 2 Reel 3: 0, 3 Reel 4: 2 Reel 5: 2-3 Reel 6: 0, 3	Complete	6	Reel 1: 2 Reel 2: 1-2 Reel 3: 1-2 Reel 4: 2 Reel 5: 2 Reel 6: 2	2/19/18 2/19/18 2/19/18 2/19/18 2/19/18 2/26/18

Table 1. Nitrate prints examined at Louis B. Mayer Conservation Center from January 29, 2018 through February 26, 2018. Table created by author.

# Appendix B

TITLE: Gypsy Blood LOC: FGA4716-21 ACCESSION: 1975.0007.2506

MARK ON A SCALE OF 1 TO 4  
1 = Slight -- 2 = Fair -- 3 = Moderate -- 4 = Heavy

	REEL	1	2	3	4	5	6	7	8	9	10
EMULSION SCRATCHES		3	3	3	3	3	3				
BASE SCRATCHES		3	2-3	2	2	3	3				
PERFORATION DAMAGE THAT HAS BEEN REPAIRED		0	0	0	0	0	0				
PERF DAMAGE THAT HAS NOT BEEN REPAIRED		3	2	2	2	3	1				
EDGE DAMAGE THAT HAS BEEN REPAIRED		0	0	0	0	0	0				
EDGE DAMAGE THAT HAS NOT BEEN REPAIRED		3	2	2	2	3	2				
OIL -- DIRT		2	1-2	1-2	1-2	1-2	2				
FADING		3	1-2	3	3	3	2				
WARPAGE		4	2-3	2	3	2	3				
HEAD LEADER SPLICED (Y/N)		Y	Y	Y	Y	Y	Y				
TAIL LEADER SPLICED (Y/N)		Y	Y	Y	Y	Y	Y				

FIAT SCALE OF NITRATE DECOMPOSITION — IPI SCALE OF ACETATE DECOMPOSITION (A-D Strip Testing)

	REEL	1	2	3	4	5	6	7	8	9	10
DECOMPOSITION LEVEL		2	1-2	0-2	2	2	2				

SHRINKAGE PERCENT

REEL	1	2	3	4	5	6	7	8	9	10
SHRINKAGE	2.17%	1.92%	2.00%	2.16%	1.95%	2.76%				

MARK APPROPRIATE AMOUNT

REEL	1	2	3	4	5	6	7	8	9	10
SPLICES	20+	20+	20+	20+	20+	20+				
FOOTAGE	[1,000]	[1,000]	[900]	[1,000]	[975]	[775]				

FOOTAGE TOTAL: [5,650]

NOTES: Eastman Kodak  (image) /  (titles)  
 Phertyping throughout with slight mold in sections, decomp at softest, weak splice 50' from tail, slightly sticky frames at 200' and 225' from tail, almost completely broken splice in green tint around 310', small sections throughout with hardened and some sticky honey, large sections of image loss starting from 425' with 100% image loss brittle edges, broken perf at 625', a piece of repair tape is now turning off 675', broken splice at 750'

CONDITION: poor PROJECTABLE (Y/N): N

2/19/18 - 2/26/18

Figure 1. Sample of print condition report for *Carmen (Gypsy Blood)*, Louis B. Mayer Conservation Center, prepared by author February 19 & 26, 2018.



Figure 2. *Garden of Allah*, 1916, reel 5, visible stickiness, Louis B. Mayer Conservation Center, photograph taken February 5, 2018 by author.



Figure 3. *Garden of Allah*, 1916, reel 4, image loss, Louis B. Mayer Conservation Center, photograph taken January 29, 2018 by author.



Figure 4. *Carmen (Gypsy Blood)*, 1918, reel 1, image loss, Louis B. Mayer Conservation Center, photograph taken February 19, 2018 by author.



Figure 5. *Carmen (Gypsy Blood)*, 1918, reel 1, tinted/toned sections, Louis B. Mayer Conservation Center, photograph taken February 19, 2018 by author.





Figure 6. *Carmen (Gypsy Blood)*, 1918, reel 2, tinted/toned sections, Louis B. Mayer Conservation Center, photograph taken February 19, 2018 by author.



Figure 7. *Garden of Allah*, 1916, reel 4, intertitles, Louis B. Mayer Conservation Center, photograph taken January 29, 2018 by author.



Figure 8. *Call of Her People*, 1917, reel 1, intertitles, Louis B. Mayer Conservation Center, photograph taken on February 12, 2018 by author.



Figure 9. *Garden of Allah*, 1916, reel 1, opening credits, Louis B. Mayer Conservation Center, photograph taken February 29, 2018 by author.



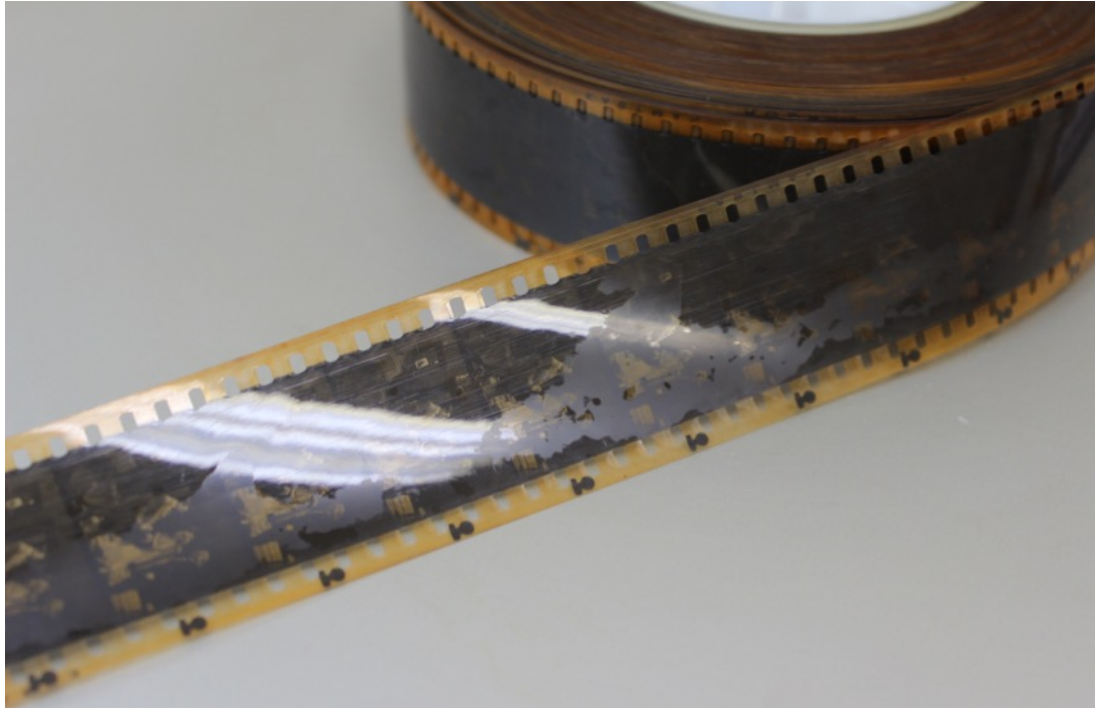


Figure 10. *Plain Jane*, 1916, reel 5, ferrotyping, Louis B. Mayer Conservation Center, photograph taken February 6, 2018 by author.



Figure 11. *Garden of Allah*, 1916, reel 5, mold, Louis B. Mayer Conservation Center, photograph taken February 5, 2018 by author.

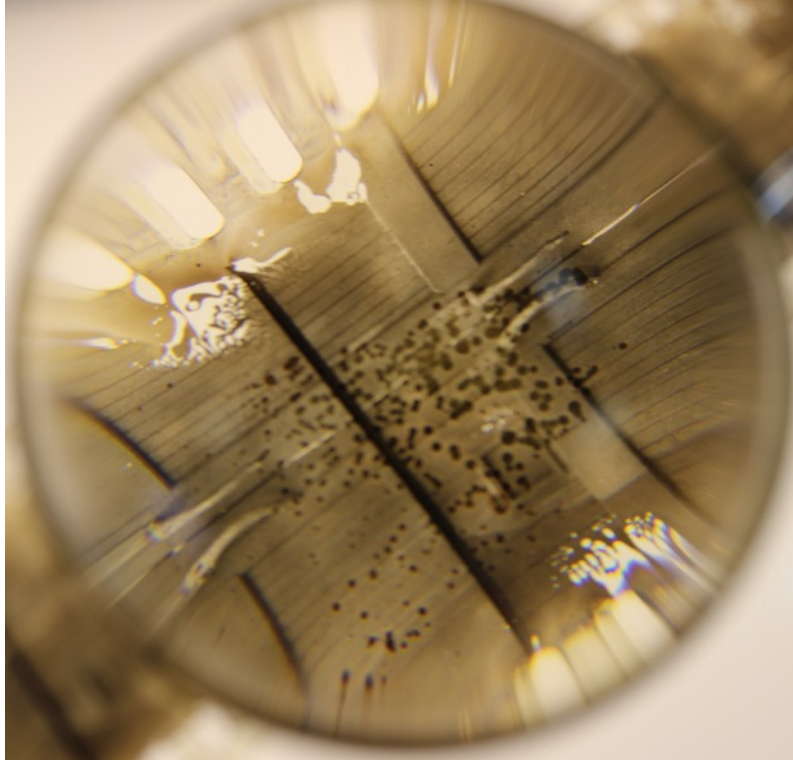


Figure 12. *Garden of Allah*, 1916, reel 5, mold, Louis B. Mayer Conservation Center, photograph taken February 5, 2018 by author.

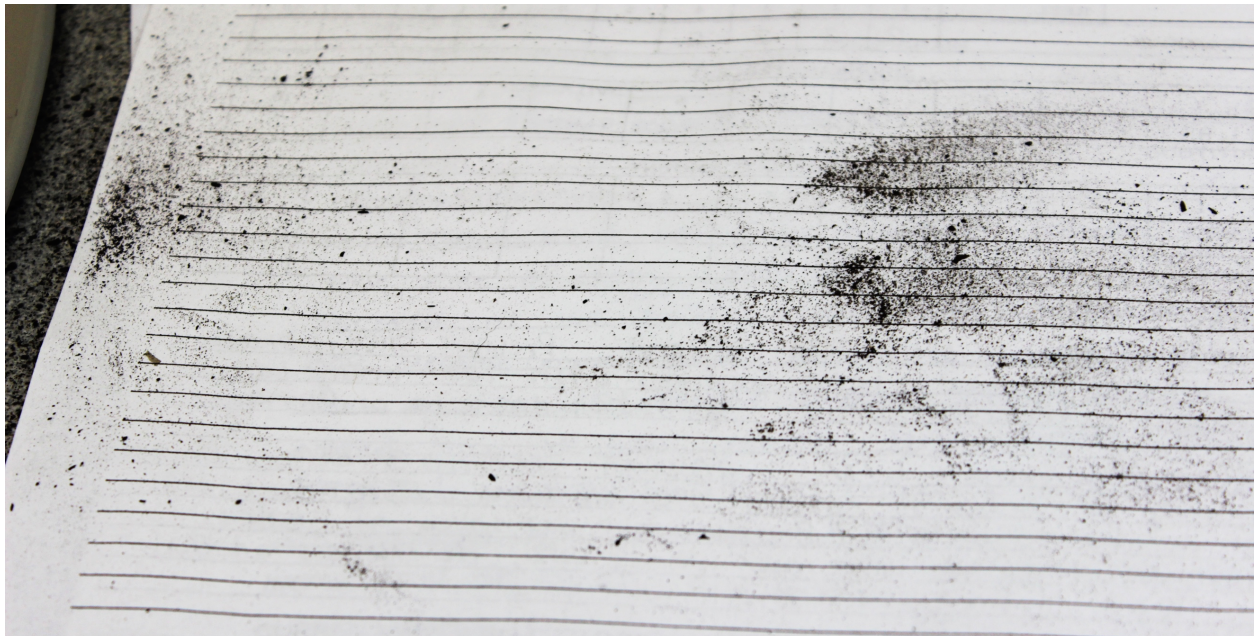


Figure 13. *Garden of Allah*, 1916, reel 5, film particles from brittleness, Louis B. Mayer Conservation Center, photograph taken February 5, 2018 by author.



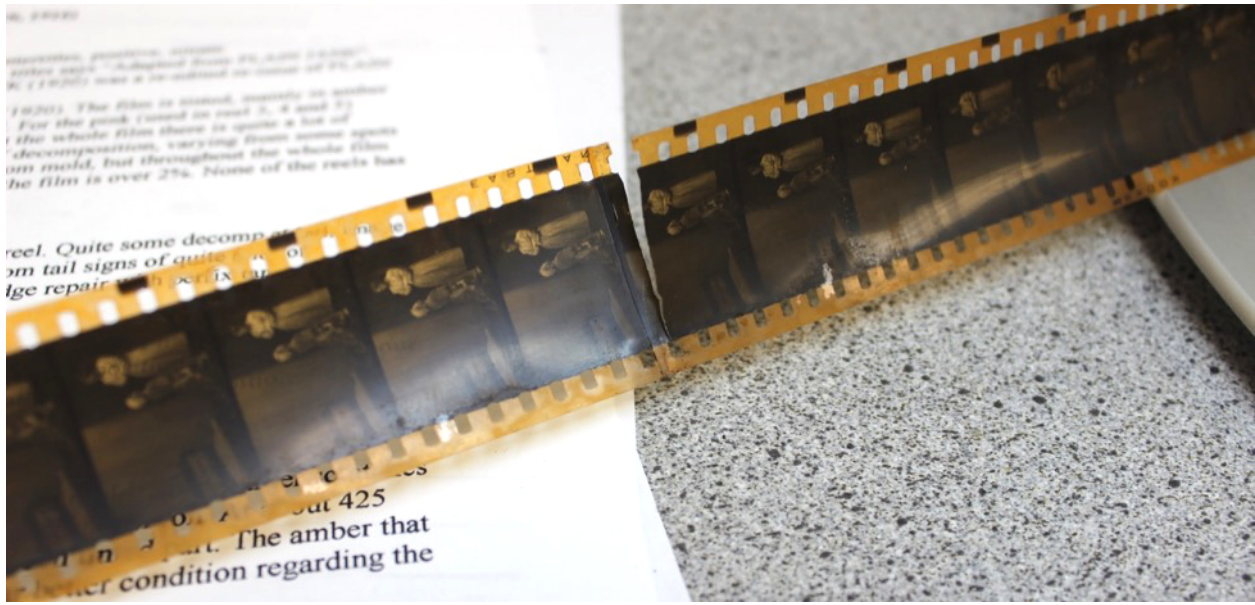


Figure 14. *Plain Jane*, 1916, reel 1, tear through film, Louis B. Mayer Conservation Center, photograph taken on February 6, 2018 by author.

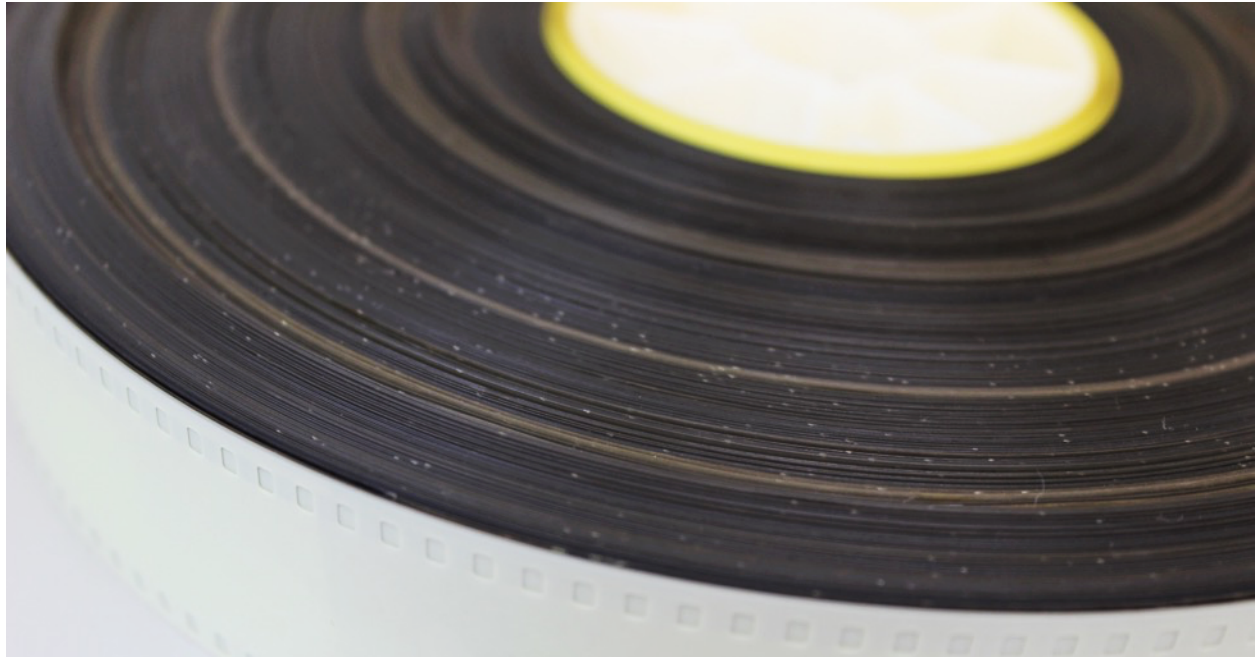


Figure 15. *Call of Her People*, 1917, reel 2, crystallization, Louis B. Mayer Conservation Center, photograph taken on February 12, 2018 by author.



Figure 16. *Call of Her People*, 1917, reel 1, hardened honey, Louis B. Mayer Conservation Center, photograph taken February 12, 2018 by author.

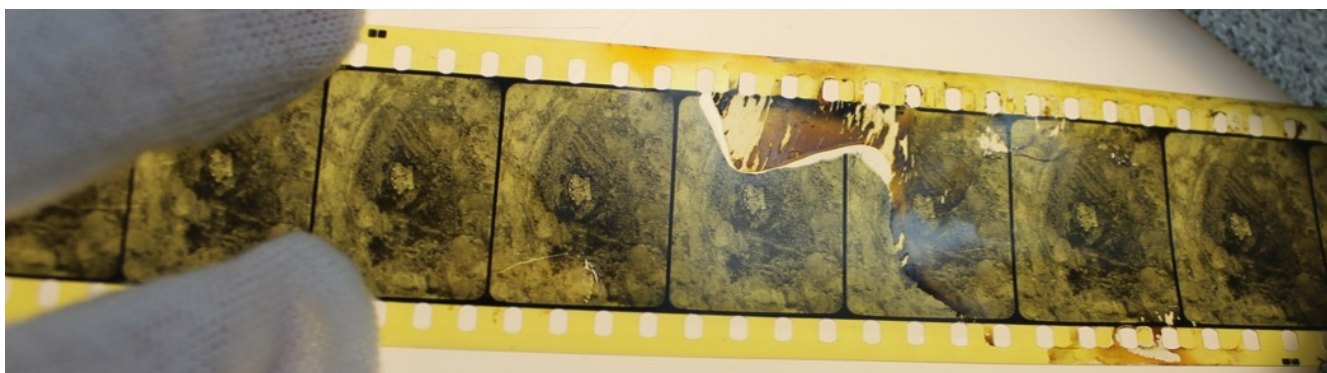


Figure 17. *Carmen (Gypsy Blood)*, 1918, reel 1, hardened honey, Louis B. Mayer Conservation Center, photograph taken February 19, 2018 by author.