



# The Lumière North American Company: Seeing Is Believing

*The Lumière factory building in Burlington has survived, although largely unknown to city residents. Recent historical research in Vermont has uncovered evidence that suggests how these renowned inventors contributed to the media used today in communication, science, and artistic expression, and how Burlington came to be the place where some of these dramatic developments took place.*

By HUGO MARTÍNEZ CAZÓN

Although in the United States their legacy is no longer widely known, the internationally recognized pioneers of photographic technology Antoine Lumière of Lyon, France, and his sons Louis and Auguste, established and managed their North American operations in Burlington, Vermont, from 1901 until 1912. The legacy of Lumière cinema lives on in blockbuster films produced each year, and festivals in France and Canada.<sup>1</sup> In 2008, when France celebrated the centennial of the Lumière brothers' invention of cinema, it was a national event. Yet their photographic materials factory build-  
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ing, constructed in 1901-02, quietly endures historical silence on the shore of Lake Champlain. Although undergoing adaptation for reuse,<sup>2</sup> as of 2021 the building still stands as tangible evidence of Vermont's participation at the dawn of the revolution in color photography that transformed how the world is seen.

### THE ELUSIVE SEARCH FOR COLOR

The quarter century between the Centennial Exposition of 1876 and the World's Columbian Exposition in 1893 ushered in an array of new technologies such as radio communication, x-rays, electric lights, and telephones, announcing modern society. The arrival of photographic technology in the mid-nineteenth century was among the dramatic changes to our collective artistic expression. During this time, Vermont's population was declining, as young men and women left to pursue manufacturing and industrial jobs elsewhere. Burlington was the exception, as railroad and water connections linked its industries and manufacturers to national and world markets.<sup>3</sup>

As the twentieth century began, direct color photography was added to the list of the world's exhilarating discoveries and inventions. It was known then as the Lumière process, or Autochrome (Autochrome). The images created then still capture that moment of awe and discovery: the reproduction of natural color for the first time. By 1903, when pioneering photographic chemist Claude-Antoine Lumière of Lyon retired, his sons Louis and Auguste were experimenting with cinema and color photography, and the Lumière brothers' "autochrome" color process was under development.<sup>4</sup> It was at this time that the Lumière brothers established a factory for their photographic plates in Burlington, Vermont, to augment their home plant in Lyon.



*Louis (left) and Auguste Lumière, sons of photographic pioneer Claude-Antoine Lumière of Lyon, worked as a family to achieve innovations including cinema and direct color photography. Wiki Commons, Institut Lumière, accessed 2/21/2021.*

Since the 1990s there has been increasing international awareness of and attention to the process that first offered direct color photography. Yet despite renewed interest in this photographic process, the early adopters of this technique, and the images they created, little has been written about the factories where the process was born.

In Lyon, while the cultural contributions of the Lumière family are still celebrated, the factory complex of the Lumière brothers was demolished in the 1970s during urban renewal efforts. The great majority of the material history and the written records for the factories were lost.<sup>5</sup> The Lumière factory building in Burlington has survived, although largely unknown to city residents. Recent historical research in Vermont has uncovered evidence that suggests how these renowned inventors contributed to the media used today in communication, science, and artistic expression, and how Burlington came to be the place where some of these dramatic developments took place.

#### THE SEARCH FOR CAPTURING DIRECT IMAGE, THE BEGINNINGS OF PHOTOGRAPHY

From the first cave drawings by Neanderthals, humans have created images of the world around them. The search for means to directly capture what we see, and to convey that exact image to others, culminated in the year 1839 with the advent of daguerreotypes.<sup>6</sup> These marvelous images of a person or a landscape used silver-plated copper sheets fumed with mercury vapors to create an image.

Chemists, optical physicists, and inventors accelerated efforts with each new scientific development, and the earliest photographic images began to appear: a blurry, long-exposure image of a simple shoeshine boy on a street, seen from an attic balcony, was a wonder!<sup>7</sup> In just over a decade, after 1822, optical imaging went from a heliographic sketch to direct daguerreotype images of what the eye could see. But those earliest images were in a contrast of black-and-white. Although the inventors of the era were elevated to national heroes, the search continued, because direct color was not yet achieved. Competition became increasingly fierce, driven by humanistic intentions of creating something beneficial to the world, as well as the potential for great profits.

The Civil War era in the United States demonstrated the immeasurable power of photography, as black-and-white images presented the magnitude of devastation, the brutality of slavery, and preserved the likenesses of distant or lost loved ones.<sup>8</sup>

For the first time, everyday people in distant places could feel direct connection to an event. It was more powerful than the telegraph or the printed journals reaching distant lands by railroad and steamer. There were no action photographs of the Civil War, as the wet-plate collodion

negatives then available required from five to twenty seconds exposure. So, powerful as these black-and-white images were, the quest for further progress in photographic technology only accelerated, in both Europe and America.<sup>9</sup>

#### ANTOINE LUMIÈRE AND THE QUEST FOR COLOR

The well-documented and complex competition in photographic technology involved commerce as much as art and science. In Lyon, France, M. Claude-Antoine Lumière (1840-1913) had been working for over twelve years making improvements to the development process for black-and-white photography, and making photographic plates.<sup>10</sup> He enjoyed some success, and he brought his sons Auguste (October 19, 1862-April 10, 1954) and Louis (October 5, 1864-June 7, 1948) into the effort, both to increase the possibilities, and to conceal his methods from his competitors.

Claude-Antoine Lumière had moved his family from Besançon to Lyon in 1870. There he established a photographic studio and sent his sons to La Martinière technical school. Lumière père worked at producing quality development plates, and undertook to make a reputable black-and-white image with the help of his son Louis and his daughter Jeanne Claudine Audette Lumière (April 2, 1870-November 24, 1926).<sup>11</sup> When his elder son Auguste joined the effort, the company accomplished a series of history-making breakthroughs.

Lumière made a name for himself and earned the respect of his competitors. By 1906, the Lumière facilities in Lyon had gone from making about 600 photographic plates per day to 70,000 plates daily, as the production facilities grew to cover four hectares in six different buildings.<sup>12</sup> Other inventors also were making competitive progress on many fronts as well. Quietly, Lumière worked on the goal that had eluded everyone: color.

The chemical innovations that advanced the technology of photography were followed closely in a myriad of trade journals worldwide, as the chemists and photographers of Russia, Germany, France, England, and the United States made breakthroughs or shared improvements on existing methods. Popular journals like the *Photographic Times* and *Scientific American*, and specialized scientific publications like the *Bulletin de la Société Astronomique de France* et *Revue Mensuelle*<sup>13</sup> announced new discoveries and presented long technical explanations of the development processes. As the possibility of achieving direct color drew closer, the sense of anticipation was palpable in each article.

Then from St. Petersburg came word that someone had cracked the code to color. Sergei Mikhailovich Prokudin-Gorskii demonstrated that he could create a lifelike color image.<sup>14</sup> He had improved on the “three



*Model (Charette), Lumière Factory, Lyon, France on exhibit at Institut et Musée Lumière. This factory in Lyon (now demolished), and the factory in Burlington, Vermont, were the only two sites at which Autochrome plates were produced. Photo: Hugo Martínez Cazón, 2019*

color” method explored by numerous European chemists working on improvements in the dye process. His breakthrough around 1906 was so noteworthy that he was given an audience with the tsar in 1909. At the time, Russia was strictly divided into social classes and for a chemist, meeting the head of the enormous empire was unimaginable. Yet Prokudin-Gorskii so impressed the tsar that he was given a commission to travel throughout the empire from 1909 to 1915 in a train with a coach specially equipped as a photographic processing lab, to create a visual atlas of the peoples of the land. These images were stunning, yet they were produced through a visual illusion. The process relied on making three independent images to create slides, which in turn were projected simultaneously to create a visualization showing the three-tone approximation of the original color. The images are gorgeous and document an agricultural lifestyle now vanished. But the goal of direct color imaging had not been reached. Direct, lifelike, and accurate color

remained a tantalizing ambition. It was not yet possible to “take a picture” in color.

As the twentieth century began, the 1900 Paris International Exhibition (Exposition Universelle) represented the height of French cultural influence worldwide. The event brought together representatives of forty nations, colonies, and protectorates to celebrate the achievements of the past century and showcase innovations that would soon transform society. The 534-acre site featured motorized moving sidewalks, a pavilion dedicated to electricity, designs for zeppelins, industrial machinery, and other marvels. The most advanced and successful efforts of photography from each participating country were presented at their respective pavilions.<sup>15</sup> The British juror for photography, E. Cecil Hertslet, reported that the most noteworthy progress was on view at the French exhibits, which equaled in number those of the rest of the participating exhibitors. Hertslet commented on the industry of Messrs. Lumière and Sons of Lyon for “plates and papers, cinematographs and films, artistic photographs, and transparencies of the moon,” mentioning also their reputation as “chemists in the theoretical aspects of photography” from the “largest and most [well] equipped dry plate works in the world.” He also noted “some very interesting three-colour transparencies.” In his report, Hertslet mentioned that the Lumière products were about to be represented in London by Photochrom Company, under the management of a Mr. E. Llewellyn (*sic*) White.<sup>16</sup> Hertslet was unable to meet with White, who was proceeding to America “on business connected with the Lumière Company,” but details were not disclosed. However, it would soon become evident that White was in the United States, scouting for a location for a future Lumière North American plant. White’s scouting trip would lead him to choose Burlington, Vermont.

#### LA MAISON LUMIÈRE BECOMES A TRANSNATIONAL ENTERPRISE

The growing popularity of Lumière black-and-white photographic plates was incentive enough for the Lumière family to consider expansion into international markets. Demand for the amazing new technology was growing notably each year. They had never established a European manufacturing plant outside the Lyon area. Now, exporting into the British Empire with a London sales base looked very promising. The Lumières established Lumière North American Limited, based in London, with British investors, and contracted the export and distribution of their products to “The English Company” (as it became known). The company had a declared capital of £200,000.<sup>17</sup>

The United States was another tempting market. After careful consideration, the Lumière brothers, who were very protective of their inven-



tions and patents, decided to build their second manufacturing plant in the United States. Setting up a plant in the US would be a risk but could also open an important market for an unchallenged technology, without any comparable competition.

The North American market, although attractive, had tariff hurdles that were difficult to navigate.<sup>18</sup> After the US market collapse of 1893, the 1894 Wilson-Gorman Tariff Act had lowered import tariffs. When this failed to restore prosperity, the Dingley act of 1897 substantially raised tariffs (up to over 50 percent) on imported goods overall. Tariffs and customs regulations were difficult to apply in an equitable manner because the technologies for photographic processing were still in rapid development and the tariff system did not adjust at the same pace. Some of the competing photographic techniques in black-and-white relied on treated glass, while others relied on paper. The tariffs on treated glass were not comparable to those for chemically treated photographic paper, so any company relying on glass plates would be at a disadvantage relative to photographic paper. Avoidance of these import tariffs was one of the main reasons why the Lumières decided to establish a manufacturing operation in the United States.<sup>19</sup>

#### THE CHOICE OF BURLINGTON VERMONT AS THE LOCATION FOR LUMIÈRE NORTH AMERICAN

By 1900, the small city of Burlington on Lake Champlain had become a powerhouse of dye production for the textile industry. It would soon find itself coloring the images of the world. Burlington offered an unparalleled combination of advantages for the Lumières. The placement of the Lumière factory in Burlington was both a commercial and a scientific strategy. Although distant from population centers in Boston or New York City, the town's port facilities and robust railroad network allowed product delivery to the East Coast and easy access to the Midwest, as well as an export route to Canada. Burlington was an industrial center with unique chemical and manufacturing expertise. Alongside some of the nation's largest medicine fabricators such as Taft's Mhyrline toothpaste and the Wells & Richardson patent medicine company, Burlington was home to the Diamond Dye company, one of the largest producers of chemical dyes in the world. The chemical advancements necessary to achieve improved black-and-white images were even more important for direct color photography. Another great advantage was that Burlington's substantial French-speaking workforce would allow a vice president from Lyon to run the factory.

At the dawn of the twentieth century, Burlington had a population of 18,640. The city was served by three railroad lines—Central Vermont, Rutland, and Rutland Canadian—and was one of the largest lumber

### Burlington Businesses, 1903

W & D. G. Crane, lumber	Queen Anne Screen Co.
Robinson Edwards Lumber Co.	Vermont Shade Roller Company
J. R. Booth, lumber	Baldwin Refrigerator Co.
Champlain Mfg. Co., interior house finishings	Eclipse Refrigerator Co.
Mason & Co., interior house finishings	Monarch Refrigerator Co.
E. A. Pope & Co., packing boxes	Cutlery Co.
Burlington Cotton Mills	Goodhue Lang Mfg. Co., machinery
Queen City Cotton Co.	Horatio Hickok Co., wooden boxes
Burlington Woolen Co.,	The Wells-Richardson Co., patent medicines, and dyes
Branch of American Woolen Co.	<b>The Lumière North American Co., mfrs. of photo plates and papers</b>
Burlington & Winooski Mills	Burlington Shirt Co.
Vermont Spool & Bobbin Co.	Henry Johnson & Lord, patent medicines.

*From National Newspaper Directory and Gazetteer (Boston: Pettingill's Newspaper and Gazetteer, 1903).*

markets in the world. Wholesale manufacturing trade amounted to \$14,000,000 annually (about \$391,121,131 in today's dollars), and smaller industries employed some 3,500 people with monthly wage receipts of \$140,000. Soon Lumière North American was listed among the city's cluster of industries.<sup>20</sup>

#### A NEW TYPE OF FACTORY IS BORN AT LUMIÈRE PARK

By 1901 the location for the new Lumière North American plant had been determined.<sup>21</sup> A notice in the *Photographic Times* announced the ambitious project:

Burlington, Vermont was chosen as the location of the American factory, and the contracts for the construction of the plant have just been awarded. The new factory is to be completed by September and will cost according to press reports about \$100,000. Mr F. G. [sic] White is the resident manager of the concern with offices at Burlington.<sup>22</sup>

In today's dollars the factory would cost approximately \$2,793,722. Ambitious plans for the Lumières' North American presence were announced: "The head offices of the company in America will be located at Burlington and branch offices will be established at New York, Chicago, Detroit and other points."<sup>23</sup>

To highlight how deep speculation about the project ran, and how much attention was focused on photographic innovation, in 1901 the Lumières felt it necessary to ask their licensed London-based agent to



refute stories that George Eastman had purchased their Burlington plant. Their terse statement said all that was needed:

The Lumière North American Company, who are the sole proprietors of the celebrated Lumière products for Great Britain, India, the Colonies, and North America, wish you on behalf of Messrs Lumière of Lyons, to emphatically deny the purchase of their business by Mr George Eastman, or any other person, and we shall be obliged by your giving prominence to this denial.<sup>24</sup>

This notice, which appeared in *The Photographic Dealer and D. and P. Review* in 1901, was signed by the London director of Lumière North American.

Upon arriving in Burlington, White purchased the historic Lucia Bradley Peck mansion, which had been vacant since 1898.<sup>25</sup> He would oversee the construction project, on behalf of the Lumière North American Company. The year 1902 opened auspiciously:

Work of building to be begun as soon as possible—Manager F. J. White returned Friday morning from Boston, where he has been for several days inspecting the plans for the buildings to be erected by the Lumière North American Co. They have not yet been completed in detail but will soon be ready for the contractor. It is expected that the contracts will be let by February 21 and as soon after that as possible work will be begun. It is not probable that the frost will be out of the ground sufficiently to allow the work to progress before April 1, but if work is begun then, it is expected that the buildings will be completed some time in September. J. A. Poulailion, the expert engineer of the company, will sail February 1 from France and is expected in New York about the 7th. Mr. White will meet him there and they will go at once to Boston to inspect the plans and then come to Burlington. Mr. Poulailion will locate in Burlington permanently.<sup>26</sup>

By February 1902 the land for the manufacturing mill had been secured: “The deed transferring the Howard Park property at Burlington to the Lumière company of North America was filed in the city clerk’s office last week. The price paid is \$11,000.”<sup>27</sup>

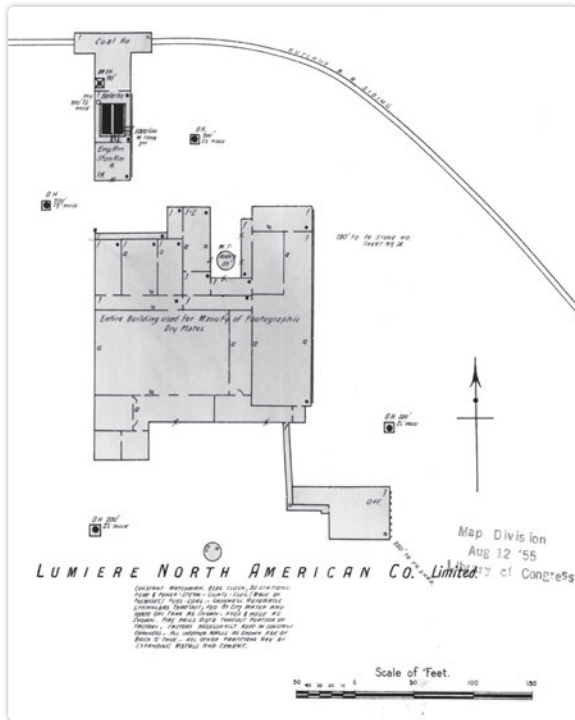
A search through historic sources including the Burlington City Directories and the Sanborn Fire Insurance Maps of the time shows the location for the plant was the nonurbanized part of town used as the Burlington Fair.<sup>28</sup>

The purchase saw the end of the Burlington Fair, and the campus would become known as Lumière Park.<sup>29</sup>

Immediately after the property acquisition, on March 13, 1902, it was announced that “The Lumière North American Company Limited, Burlington, Vt. are having plans prepared for the erection of a \$50,000 plant the contracts for the building of which will be let in about two weeks.”<sup>30</sup> The plans were soon ready for inspection by “those desiring to bid for

the contract.” The complex would consist of “three buildings, the main manufacturing plant, a structure 200 feet square, an office building, and a powerhouse.”<sup>31</sup> The factory was not a typical “mill” type building, but was designed specifically to purpose, according to the design criteria of the Lumières. The building was to be lightproof. The installation of the heating and drying system was worthy of national pride. A notice in *The Metal Worker* stating, “The American Blower Company of Detroit Mich. are installing heating and drying apparatus for the Lumière North American Company of Burlington Vt.,” indicates that the fabrication, erection, and installation of machinery during November 1902 was moving briskly.<sup>32</sup> Working conditions in the new industrial building were projected to be equally innovative—a “clean room” environment for the era:

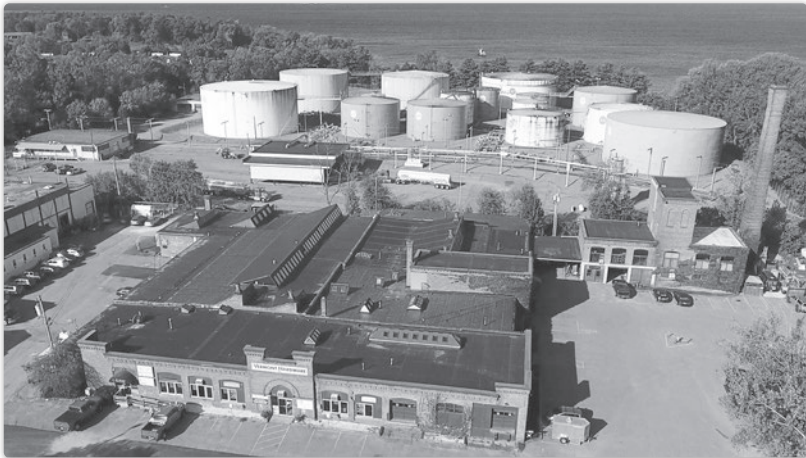
Nearly every room is dark as night but the workingmen get so accustomed to it that they can see well, after a short time. The employees are dressed in Japanese silk, which material does not catch the dust. The air is filtered several times and it is as pure as it can be made. Immense quantities of ice are used to cool the atmosphere in summer.<sup>33</sup>



*Sanborn Fire Insurance Atlas, Burlington, VT, 1904. Map Division, Library of Congress. Plate showing Lumière North American Factory. This remnant panel from the map represents an area at the foot of what was then Park Avenue (now Flynn Avenue). The factory building is marked "Entire Building used for Manuf'y of Photographic Dry Plates." A Rutland Railroad siding provided service to the coal storage area of the Boiler House.*

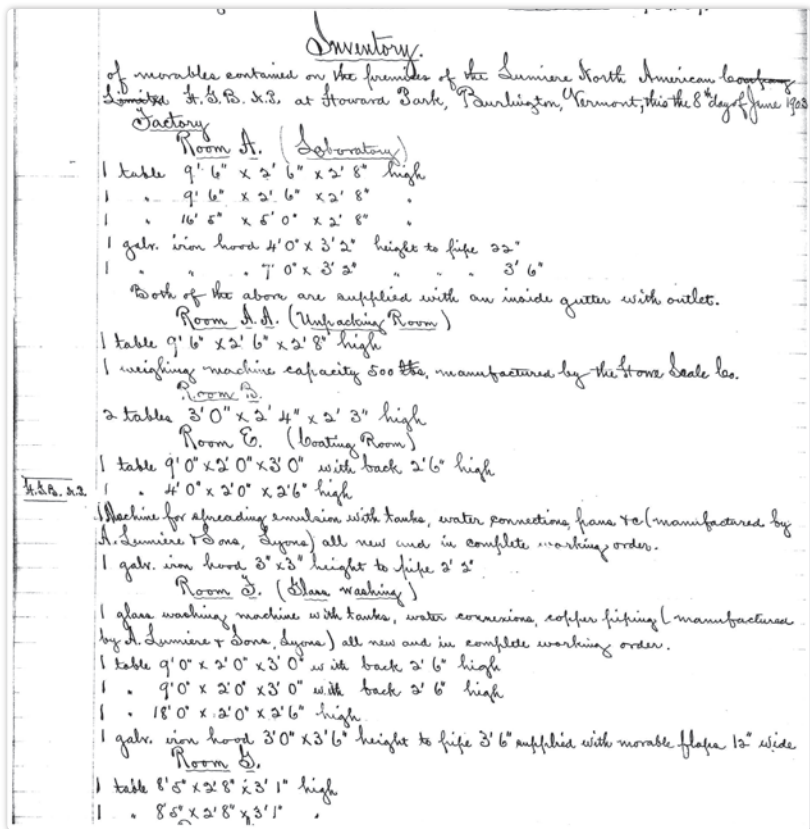
There was mounting anticipation as the building was erected, with every indication of it being an advanced design in manufacturing buildings. Refrigeration would be an important part of the industrial process, and pipes extending 1,100 feet into Lake Champlain were laid. The local paper invited watchers to observe the innovative installation technique, declaring, “The new buildings for the Lumière North American Co. are rapidly nearing completion,” adding that the buildings “are entirely different from any manufacturing building erected in the State [of Vermont].”<sup>34</sup>

The full inventory of the building in 1903, recorded in the Burlington register of deeds, offers evidence of its highly advanced factory design and equipment.<sup>35</sup> The very best machinery made in the US was obtained to furnish the works. Westinghouse engines and Edison electrical products figure prominently alongside pumps, work tables, and heating and ventilating equipment. This was the most modern equipment, essential for the production of photographic materials that were the most advanced of their time. The inventory lists all of the elements of the chemical laboratory, with its galvanized iron hoods and working surfaces. Alongside these US-made industrial machines, the meticulous handwritten inventory prominently lists machines manufactured for the A. Lumière et fils company, imported from Lyon.<sup>36</sup> One of these is de-



*Drone aerial photograph of Lumière North American Factory, looking west. Lake Champlain (seen beyond the oil storage tanks constructed in the early twentieth century) provided water for cooling during plant operations. Photo: Paul Gittelsohn. Screenshot from It's All in the Plate, c. 2018 by Rise Up Filming LLC, John Summa, Producer and Director; Paul Gittelsohn, Director of Photography. (See also, Illustration 3, Sanborn Atlas 1904).*

scribed by the inventory agent as a "machine for spreading emulsion with tanks, water connections, pans, etc. (manufactured by A. Lumière & Sons, Lyons) all new and in complete working order," located in "Room E (Coating Room)." Room F (Glass Washing) contained a "glass washing machine with tanks, water connexions, copper piping (manufactured by A. Lumière and Sons, Lyons) all new and in complete working order." A 500-pound capacity scale from the nearby Stowe Scale Company is also listed. The inventory is part of the transfer of the property signed by each of the Lumière brothers on February 24, 1904, at the United States consulate at Lyon.



Inventory of movables contained on the premises of the Lumière North American Co. Ltd. (8 June, 1903). City of Burlington Book of Deeds, Vol. 51, June 8, 1903, pp. 44-68. Special thanks to Mary O'Neil, City of Burlington historical architect, whose knowledge of the historic book of deeds resulted in finding the original document.

The 1904 trade magazines were abuzz about the accomplishment of building a “mill” to suit, for such an unprecedented and advanced industry, and eagerly awaited further developments:

The Lumière North American Company will begin work at once at its new plant in Burlington Vt. The company is a branch of a wealthy French company engaged in the manufacture of dry plates and other photographic material. The parent company being capitalized at \$1,000,000. The local branch purchased Howard Park from the fair association and has built within the past two years buildings at a cost of over \$100,000 [approximately \$2.8 million dollars today].<sup>37</sup>

The construction was completed within the budget announced in 1901.

Two incidents during the final phase of construction provide a glimpse of the workers whose labor brought this vision to reality. Four carpenters on the project had gone on strike on April 28, 1904, when demands to bring their salaries from \$2.25 to \$2.50 a day were not met. The Carpenters Union supported the workers, declaring that after May 1 the minimum wage for journeymen carpenters would be \$2.50 for a nine-hour day. The Lumière plant hired new carpenters.<sup>38</sup> A tragedy in July 1904 further underscored the hazards that employment at the new factory could hold for Burlington laborers. James Corcoran had been able to leave the poor farm when he “was employed by the Lumière North American Company.” Sadly, just three weeks later, Corcoran was run over in Burlington by “one of the Rutland railroad trains.”<sup>39</sup>

#### CONTROVERSY AND RESOLUTION: THE LEGAL CHALLENGES OF 1903-1907

With the factory in the US constructed and functional, and the patents secured, the story of Lumière North American could have been one of unfettered success. However, the complexity of expanding the international operations of the firm, and designing and constructing facilities for manufacturing these unique products while continuing research and development of new photographic processes, led to a variety of issues. Although the great work of constructing the Lumière plant in Burlington was successfully completed, for several years lawsuits involving the company were news statewide, both for the labor that was at stake, and for the drama of the large investment that the project represented.

In an era of increasing standardization of mill design, the Lumière plant required an entirely customized facility, suited to specialized, innovative work that would be performed in complete darkness. Frederick S. Hinds of Boston was the mill architect and engineer selected for the enterprise. In 1903, a lawsuit brought against Hinds by Lumière North American (also referred to at times as Lumière Company of Burlington) alleged that he had not provided the proper design documents or suitable general supervision of the work. Claims asserted that certain

plans were faulty, and in need of correction. The suit was for \$10,000—a substantial amount equal to nearly 10 percent of the value of the finished building. The significance of the project warranted front-page coverage in the local news when the suit began.<sup>40</sup> However, the resolution of this case did not appear in subsequent issues.

More complicated was the breach-of-contract dispute between “manager” Frederick White and the Lumière company of Lyon that extended through four years.<sup>41</sup> Not only the Burlington press, but newspapers in West Randolph, St. Johnsbury, Barre, Rutland, and Middlebury followed the developing story with fascination. In 1901, White had entered into a five-year contract with the Lumière North American Company. As a member of the company’s advisory board of directors, White’s mandate was to oversee the erection of the original buildings, and then manage operations of the company to the Lumière Brothers’ standards and shareholders’ satisfaction. The position took effect on September 5, 1901, at a starting salary of \$4,800 per year (about \$134,000/year in today’s dollars).

Newspaper accounts reflect White’s accomplishments early in his tenure: The factory site had been acquired and the building itself was nearing completion. However, the legal hurdles and delays with architect Hinds hint at deeper management issues that now began to emerge into public view. On October 15, 1903, Lumière North American informed White that the entire company had been leased to “a French company” (the Société Lumière). The French company would take over operations in Burlington and name the staff they saw fit, “which they were sending from Lyon.” The court case transcript of *White v. Lumière North American Co.* noted also that “Messers Lumière . . . [would] arrive in Burlington, on the 19 of October 1903,” foreshadowing the imminent property transfer to the new corporate owner and an upcoming change in management.

White promptly took action. He had an attachment placed on “the personal property of the Lumière North American Company” for the value of the full salary owed to him under his five-year contract, and the factory was closed pending review and decision by the courts.<sup>42</sup> White held that he was contracted by the “English firm” and therefore could not recognize instructions from the “French Company.” The Société Lumière countered with an offer that White remain under pay and fully at their disposition. Alternatively, they would consider conditions for termination of the contract, if White decided to stay in the US and seek employment elsewhere. White did not accept their offer, and on October 19, 1903, he was declared in breach of contract.<sup>43</sup> While the case remained under dispute, the closure of the plant prevented the anticipated



arrival of manufacturing machinery required for the inauguration of operations, scheduled for January 1, 1904.<sup>44</sup>

In December 1903, a front page story in the *Middlebury Register* reported that, at the first hearing, Judge James M. Tyler denied the petition by Lumière North American Co. to have the attachment dismissed or reduced. This was echoed in the *Burlington Free Press* of December 24.<sup>45</sup> However, by January 1904, the case was decided. Despite objections by White's legal counsel, Judge H. R. Start ruled that White was not owed five years of salary; instead, a bond of \$7,000 was substituted for the attachment on the property. "Since the plant has been closed the water pipes have been frozen and considerable damage has resulted," reported the *West Randolph Herald and News* on January 14, after noting a recent cold snap in Thetford, Vermont, during which "thermometers registered 60 degrees below zero."<sup>46</sup> The cost of repairs was a further blow to the Société Lumière, but now the repairs had begun, allowing the company "to commence business at once and give employment to 200 hands."<sup>47</sup>

Claims and counterclaims continued, as summarized in the 1906 *Atlantic Reporter*.<sup>48</sup> Ultimately, the courts awarded \$12,920 (about three years' salary) to White, and indicated that if this amount was not paid the property could potentially be executed. *White v. Lumière North American Co.* established a legal precedent in cases of alleged breach of contract and wrongful dismissal.

However, the Société Lumière was now able to move forward. By February 1904 the property transfer had been formally transacted and the deed was legally verified at the English and French consulates as well as the United States consulate in Lyon.<sup>49</sup> Henceforth, the Burlington plant would be wholly operated by the Société Lumière, with White no longer at the helm. The transfer brought with it a new manager, Claudius Poulaillon of Lyon.

#### THE AUTOCHROME PROCESS IS BORN

Although constructing and furnishing the factory and resolving legal disputes were the most publicly visible activities of Lumière North American during the company's first years in Vermont, important scientific work toward the goal of true color photography was taking place not only in Lyon, but in Burlington as well.

An article in the April 1903 issue of Alfred Stieglitz's *Camera Work* described the development of a color photographic process by "Messrs. A. and L. Lumière of Lyons" using specially prepared bichromated gelatin on a paper support. The author noted, "A modification of this is known as the LNA process the initials standing for the Lumière North

American Co. Ltd. . . . The process is most hopeful of any as far as prints on paper are concerned.”<sup>50</sup> These hopes would soon be fulfilled.

Patents for the Autochrome process were registered in 1904 and 1906 by A. Lumière et Fils of Lyon. Their process depended on a color screen built up with very tiny potato starch grains dyed with three colors: red, green, and blue-violet, overlaid with a thin panchromatic-sensitized film. The dye works of Burlington were a perfect source for this new technology. *The British Journal of Photography* of June 3, 1910, referred its readers to Patent 22,988 and Patent 25,718 from 1904, and Patent 9,100 of 1906.<sup>51</sup> Ironically, the images illustrating the Autochrome process in the journal are in black-and-white, as the technique for reproducing color photography in printed publications was yet to be developed.

A 1909 article in *American Photography* acknowledged, “One of the most important features of the work of this firm has been the attention Messrs. Auguste and Louis Lumière have given since 1887 to the scientific investigation of the chemistry of various photographic problems and processes, and the liberality with which the results have been given to the world. Most of them have been communicated to the Société Française de Photographie.”<sup>52</sup> Clearly, for Burlington this amazing custom-built factory was a point of justifiable pride: The wonder of color photography had only two production points, and this was the only one outside of Lyon.

#### SMOOTH SAILING AND A NEW CAPTAIN

The appointment of Claudius Poulaillon as manager of the Burlington plant was not merely a business or administrative decision. Poulaillon was himself scientifically and technically competent in the development of Autochrome technology and its chemistry, and he was also skilled at marketing. According to the *Inland Printer* of 1910, Poulaillon became the “efficient manager” of the entire operation. He edited the annual “Agenda Lumière,” a brochure for developers and photographers, with practical related technical information. The frontispiece of the Agenda featured a “three color” reproduction of an Autochrome portrait, which was of great interest to the *Inland Printer*. Poulaillon also published a five-language compendium of photography and developing terminology, so that markets throughout the world could easily understand the development process.<sup>53</sup> He was able to engage in technical discussions on the chemistry of the new process in English, as evidenced by articles such as his 1904 critique of Professor Namias’s suggestions for changing the Lumières’ original formula based on anhydrous sulphite of soda in *The Professional and Amateur Photographer*.<sup>54</sup>

By 1905 “the extensive plant of the Lumière North American Co. for the manufacture and preparation of photographic supplies with about 100 employees” was finally functional.<sup>55</sup> Evidently work went smoothly,

as during the years of the plant's operations local Burlington papers show no articles about labor strife or disruption of the factory's operations. Even the left-wing Barre, Vermont, labor newspaper, *Cronaca Sovversiva*, did not have articles describing labor strife or strikes.

Competition with the Lumière Autochrome process came almost immediately. The Jougla company of Paris announced in 1907 that they would soon release their own process called Omnicolore.<sup>56</sup> Patented in 1906, Omnicolore was available to the public from 1909 to 1911.<sup>57</sup> By 1912, Jougla and Lumière would join forces, but Autochrome would remain the uncontested direct color process.

Poulaillon's good management put the Lumière plant in Burlington on solid ground during the years between the 1904 patent for Autochrome and its commercialization in 1907. This included adding production of x-ray plates starting in 1905.<sup>58</sup>

#### ACCLAIM FOR LUMIÈRE: AUTOCHROME IS ANNOUNCED TO THE WORLD

The year 1907 saw Autochrome's successful release as a consumer product. The news spread rapidly across Europe and the US, changing how people saw the world. Articles, advertisements, and widespread accolades from professional and amateur photographers announced that it was finally possible for an everyday person to take a color photograph.

The first official presentation of the Autochrome process was at the Photo-Club de Paris in June 1907, and was attended by American photographic pioneer Alfred Stieglitz.<sup>59</sup> Edward Steichen, also in Paris and experimenting with photography, subsequently made an Autochrome portrait of Stieglitz, who commented, "the pictures themselves are so startlingly true that they surpass anyone's keenest expectations."<sup>60</sup> Stieglitz himself also took the opportunity to experiment with Autochrome plates in 1907 and commented for an article in *The New Photo Miniature*:

The possibilities of the process seem to be unlimited. All who see the results achieved by Mr Steichen are amazed at the remarkably truthful color rendering, the wonderful luminosity of the shadows, that bugbear of the photographer in monochrome, the endless range of greys, the richness of the deep colors. . . . From a letter in the *Photographer* of a week ago we gather that the Lumière Company at Burlington Vt. is experimenting with the plates with complete success.<sup>61</sup>

The Lumière process amazed European and US critics who "observed in Paris a reproduction of a Persian carpet by the method, and could imagine no more perfect rendering of color." Mr. F. T. Beeson of Messrs. Newnes Ltd. spoke from his experience with the new plates as "opening up undreamt of possibilities in the copying of paintings and other colored originals for photo mechanical reproduction in color."<sup>62</sup>

This was also the banner year for Autochrome in the United States, with Burlington itself as a prime subject. A *Camera Craft* article by F. Morris Steadman, a renowned portrait photographer, announced that the first color Autochrome pictures in the United States had been taken in Burlington, using six of twelve plates brought from Lyon. The Burlington factory was about to produce the plates themselves. Among the images, taken in the bright sun of the garden at the home of Joel Gates, was the four-second exposure that produced this nation's first direct color portrait: "Martha Poulaillon taken by F. Morris Steadman, the 'The First Subject for Autochrome Portraiture in the United States.'" Steadman noted:

The subject has hair of very light gold, black eyes and a fair complexion. The dress was a light rose color and hanging from the neck was a large gold locket with a smooth surface, a red rose being placed so that the locket reflected its color. Besides the usual beautiful colors of the birch tree trunk there was a band of dark wine color where the bark had come away. It suffices to say that every color in front of the lens was reproduced to perfection including the faint green of some trees in deeper shade in the background and the reflection of the red rose in the gold surface of the locket.<sup>63</sup>

*Martha Poulaillon, F. Morris Steadman, Camera Craft 14:9 (1907): 398. The portrait of Martha Poulaillon of Burlington, VT, that appeared in the September 1907 issue of Camera Craft magazine was captioned "Color Photography with Lumière Autochrome Plate." However, the image itself was printed in black and white and required a lengthy verbal description, as printing technology was not yet able to capture the distinctive range of natural color of the Autochrome process.*



Emphasizing that these images were taken without any prior experience using Autochrome, Steadman declared: "The photographer, either amateur or professional, would be satisfied to make a single exposure, not too long, and then to be able to secure the colors in the picture by direct development. The arrival at just this point of simplicity, by the Autochrome Plate process of A. and L. Lumière, is the sensation of the year in photography."<sup>64</sup>

The success of Autochrome is reflected in a continuous array of articles as well as ubiquitous advertisements in photographic journals of the day. The New York office for the Lumière North American Company advertised that a free dry plate was available for the asking, highlighting the locations of the factories in Lyon and Burlington.<sup>65</sup> In 1907, The Polytechnic on Regent Street in London had a Christmas season competition of Autochrome portrait photographs that winter.<sup>66</sup>

As 1907 came to an end, a dinner was held at the Hotel Brunswick in Boston, attended by Antoine Lumière himself, who was honored as technical director of the Lyon factory where the remarkable photographic innovations had been made by Antoine and his sons Louis and Auguste. The attendance of C. Poulailhon, and J. E. Brulatour was noted, each described as from the "Lumière agency." A decade later, *Photo-era Magazine* reported on the historic dinner, an event so memorable and noteworthy that another dinner was convened that year in commemoration. A photo of Antoine Lumière appears in the article.<sup>67</sup>

On December 17, 1907, just two days before returning to France, Antoine Lumière was honored with another dinner, this time at the Majestic, in Philadelphia. As *The Camera* noted, the gathering was held "In appreciation of the advances that the house of Lumière has made in color photography and the fact that the only practical step so far advanced has been accomplished by them." Representatives from Drexel University and The Franklin Institute were present, along with Edouard Lumière and J. E. Brulatour of the Lumière Company New York, who also gave a speech.<sup>68</sup>

*International Steam Engineer*, the official journal of the International Union of Steam Engineers, reported that after fourteen "untiring" years of development, the Lumières had revealed in June 1907 their perfected direct color photography in Paris. The magazine declared it second in importance only to the original discovery by Daguerre, and poetically added:

The Lumière autochrome plate photographs color with as great ease and directness as the Marconi wireless transmits its aerial message through space, and is no less wonderful as a revelation of the only half-guessed possibilities inherent in the natural forces of the universe.<sup>69</sup>

Color was no longer solely the domain of the painter.

#### ALFRED STIEGLITZ AND LUMIÈRE AUTOCHROMES

Upon his return to New York from Paris, where he experimented with artistic alterations of the Autochrome process with his colleagues Edward Steichen and Frank Eugene, Alfred Stieglitz declared that he had autochrome plates of quality superior to the ones in Lyon. The Burlington plant was quiet about when they would release plates, but beside the



That same year, 1907, Stieglitz presented the Autochrome work of his “Photo-Secessionist” colleagues for the first time at his Little Galleries in New York City. Previewing the exhibit in October, the writer for *American Photography* was unable to find words to describe his impressions as he was moved to tears, having thought he would never live to

*Alfred Stieglitz published this enthusiastic endorsement of the newly available Autochrome color photographic plates "written specially for Down-Town Topics" in the issue of December 1907. Collection of the New York Public Library.*



see this advancement. He described “the Godlike power that had been given to man” to reproduce these images, declaring “the colors are in the highest degree artistic” and “must be seen to be believed.” At the time of writing, the author stated, “the plates are not on sale in this country . . . but doubtless before this reaches the eye of the reader they will be in the hands of the dealers.”<sup>71</sup>

Stieglitz was tireless in his praise of Autochrome, claiming, “Thanks to the Lumière plate every photographer can now readily make real color photographs. All he needs is his own camera and lens, a box of the plates with the Lumière adjusted color screen, and Lumières’ little booklet of instructions.”<sup>72</sup>

#### AUTOCHROME FOR EVERYONE

By 1908 advertisements for retail Autochrome plates were commonplace in photographic journals. They highlight the wonder, novelty, and increasing demand for Autochrome direct color plates.<sup>73</sup> Throughout

the year 1908, publications for the photographic trades repeatedly show the prices for color Autochrome plates dropping as demand increased, further enhancing its appeal to amateur and professionals alike.<sup>74</sup> Packages of four plates varied from \$1.50 to \$4.00, depending on plate size. Although color plates were approximately fifteen times more expensive than black-and-white,<sup>75</sup> Autochrome plates quickly went from the realm of scientists and professional artistic photographers to become increasingly a consumer product. As the Barre, Vermont, *Daily Times* reported, “The plates render color . . . not as tones of monochrome, . . . all that is asked of the user is correct exposure” to produce color images that were “not merely nearly perfect or almost as good but absolutely and perfectly true to nature,” indicating that “this marvel could be bought for a few dollars.”<sup>76</sup>

**Lumière  
Autochrom  
Plates**

**For direct color Photography**

**New Prices**

3¼ x 4	per box of 4 plates	\$1.50
4 x 5	“ “ “ “	2.00
5 x 7	“ “ “ “	2.50
6½ x 8½	“ “ “ “	4.00

¶Get acquainted with our other products, for instance our NEW SIGMA Plates, *guaranteed* at least twice faster than any plate made—NEW BLUE LABEL Plates, the best all around popular price Plate. ¶DIANOL: the simple developer. ¶Complete line of all grades of Papers and Chemicals imported from Lyons Factories.

*Get our Booklets; they are interesting*

**LUMIERE N. A. CO., Ltd.**  
 LYONS, FRANCE      BURLINGTON, VT.  
 NEW YORK OFFICE: 11 WEST 57th STREET

*This 1908 advertisement from American Photography shows “New Prices” for Lumière Autochrom (sic) Plates. Their world-wide popularity allowed for increased production in Lyon, France, and Burlington, VT, and prices consistently dropped. American Photography, (1908): 711.*

In Burlington, public showings of Autochrome slides demonstrating this remarkable new photographic medium were all the rage. In April 1908, J. E. Brulatour of the Lumière Company gave back-to-back presentations at the YMCA and Williams Science Hall at the University of Vermont, carefully noting that different images would be shown each time. Brulatour “first scientifically explained the discovery of the process and the method of preparing plates,” and then “by means of the lantern” exhibited

reproductions of noted paintings, beautiful pictures of scenery . . . butterflies . . . and various rock formations were shown with marvelous effect. Perhaps the most perfect pictures were photographs of persons, the colors of garments and flesh tints producing most natural effects.<sup>77</sup>

Admission was free, and special invitations were issued to members of the YMCA, the Ethan Allen, Algonquin, and Commercial clubs and their families, as well as to the officers of Fort Ethan Allen and their wives.<sup>78</sup>

Scientists immediately recognized Autochrome as a wonderful tool for documentation and presentations.<sup>79</sup> In 1909 the New England Federation of Natural History Societies session was opened by a lecture on spiders by Mr. Emerton, which was supplemented by “a series of color photographs exhibited by Dr. H. F. Perkins of Burlington . . . the majority of them loaned by the Lumière North American Company.”<sup>80</sup>

#### VERMONT LEADS THE WORLD

Community leaders also recognized Autochrome images as a tool to boost their visibility. When the Champlain Valley celebrated the 1909 tercentennial of Samuel de Champlain’s historic visit to the region, a Vermont exhibit in Burlington was planned to highlight how Vermont led the world in several large industries. The occasion clearly called for Autochromes. At the Board of Trade banquet in Randolph, Vermont, in March 1909, plans were announced for the town’s display: “Much is expected from the display of special photographs to be given each day by means of projecting them upon a screen. . . . These photographs, taken by the Lumière process, show every tint and shade of color, just as it appears naturally.” Business concerns and individuals were encouraged to take photographs to be included in the display.<sup>81</sup> In Morrisville, “representatives of the Lumière North American Co. were in town Tuesday [June 9, 1909] taking colored photographs of local points of interest” for the exhibition.<sup>82</sup>

When the event took place, the impact of Autochrome color plates was such that members of the public were advised, “It is impossible to give adequate idea of its magnitude or value, but an hour is well spent going through the Exhibit and seeing the wonderful Lumière Colored Pictures that are thrown on the screen from 9 in the morning until 10 at night.”<sup>83</sup>

The images were now called “colored photographs,” and scenes of everyday life in Autochrome would soon become the norm. The year ended with another exhibit of Autochrome plates loaned by the Lumière North American Company, this time at Burlington’s Fletcher Free Library.<sup>84</sup> About forty “views,” including twenty-two pictures of Yellowstone Park and the Canadian Rockies, were shown alongside local images. Dr. H. F. Perkins, chair of the Zoology Department of the University of Vermont, used Autochrome for photographing scientific specimens and for scenic photographs taken during his travels. The Canadian Pacific Railroad “hired Perkins to photograph the Canadian Rockies for their promotional literature and provided him with a private train for his laboratory.”<sup>85</sup> In 1909, Perkins commented, “The only drawback to the process at present is that prints cannot be made from the colored plates.” However, he was confident “that this difficulty will be overcome eventually by some other invention.”<sup>86</sup> The exhibit announcement stated, “By using the Lumière plates, the colors of nature are produced with absolute accuracy.”<sup>87</sup> Soon the images would be printable.

#### THE AUTOCHROME PROCESS CHANGES JOURNALISM AND PRINTING

In January 1908, *American Photography* offered the first successful presentation of autochrome in a print publication (“Italian Woman”; see front cover). The extra-large edition went out of print immediately. As Autochrome photographs captured true images of events, the publishing world would readily embrace the power of mass reproduction of these images as the record of fact, as commemoration of history, as illustration of concepts, and as art.

In 1910, *Scribner’s Magazine*, a national magazine of ideas and general interest stories, published an article from a professional gardener on Long Island, New York, providing landscaping principles for the creation of an appealing garden. The article is “Color Arrangement of Flowers,” by Helena Rutherford Ely. “Photographed in colors from nature by the Lumière process,” the caption proudly declares. “Illustrations from photographs taken in the author’s garden by the Lumière NA Company and Richard Morsam Meade.”<sup>88</sup>

Instead of long narratives describing each plant varietal, and its contribution to the design, thanks to a breakthrough in printing technology, the publisher was now able to offer a true color photographic image of Ely’s completed garden, something never before seen. The norm until that time was a hand-colored black-and-white original, in an attempt to suggest the colors. Now the printed reproduction presented the true colors of nature, captured in a direct photographic process and reproduced in print. This began the process of universal acceptance. Color photography would become an important tool of journalism, forever changing the

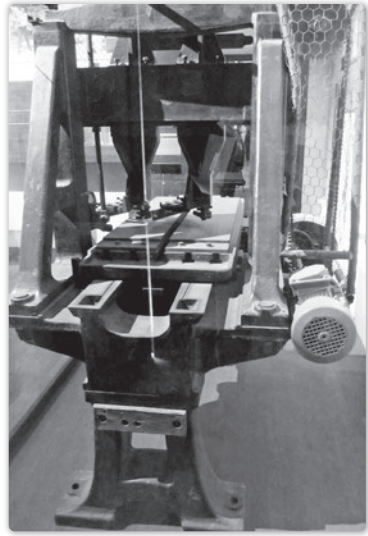
world of print media. Whereas in 1907 the color photograph of a flower took five descriptive paragraphs to convey, by 1910 the garden narrative could focus on the design and layout concepts, allowing the image to do the rest.

In 1910 the *British Journal of Photography* mentioned Autochrome photographs of the lilacs of the funeral wreath of King Edward VII. Direct color was by then the preferred record of events. “The Salisbury Wreath to King Edward: We have already mentioned that Mr. H. C. Messer of Castle Street took a photograph in colours by the Autochrome process of the beautiful wreath which was sent from Salisbury to the funeral of King Edward VII at Windsor [June 9, 1910]. . . . Mr. Messer sent a copy of the picture to King George and has received the following acknowledgment: *Buckingham Palace. The Private Secretary is commanded by the King to thank Mr. H. C. Messer for his letter of the 25th and for the photograph of wreath.*”<sup>89</sup>

It is also worth noting, however, that by this time every kind of photographic process could be manipulated by photographers to alter the reported reality. The same journal carried an extensive report from the *Daily Express* on their legal dispute with photographers selling “fake” prints.<sup>90</sup>

#### LUMIÈRE NORTH AMERICAN IN BURLINGTON—THE FINAL YEARS

The success of the Burlington factory was a source of pride to employees, and its significant labor force helped to define the firm’s local economic importance. The Burlington Lumière plant’s presence in local newspaper stories allows us to see some of the dedicated Burlington workers who had contributed to the decade-long presence of the Lumière North American Company. For example, during a 1910 power outage, all of Burlington’s trolleys that had been extended to the factory came to a standstill, leaving commuters and workers stranded. While the trolleys were out of service, horse-drawn barges carried workers home



*Autochrome Press, ca. 1907. Collection of the Institut et Musée Lumière, Lyon, France. Used by permission. Photo: Hugo Martínez Cazón, 2019.*

from the Lumière plant, the lack of trolley traffic reminding old timers of the horse-drawn wagon days.<sup>91</sup> In the social column, the notice that “on October 1, 1910 Mr. and Mrs. Samuel E. Hull celebrated their 60th wedding anniversary” mentioned that Hull had been working at the Lumière plant for eight years.<sup>92</sup> But just when the final breakthrough in printing Autochrome images would truly make natural color available to ever-wider mass audiences, the Lumière North American Company decided to shutter their Burlington operations. Many factors in the ever-evolving world of photography could have contributed to the decision, such as an increased tariff on imported gelatin used in the production of photographic materials.<sup>93</sup> While specialized publications related to photographic technology and artistry continued enthusiastic reporting and discussion about Autochrome and other rapidly evolving photographic media, coverage by the Vermont press became terse, reporting rumors, speculation, and soon after, the closing.

The stories began to surface in September 1911. “Plant May Be Moved,” said a headline in the *Burlington Free Press*. “Possibility That Local Branch of Lumière Company May Be Discontinued.” Recalling “it has been said from time to time that the American end of the business was liable to come under control of the Eastman company of Rochester, of Kodak fame,” the article noted that “employees say that the business is apt to be removed to the main plant in Paris, France. . . . [T]hey can manufacture their goods in Paris and pay duties to this country cheaper than they can manufacture and sell them in the United States.”<sup>94</sup> These rumors were echoed in other Vermont newspapers including the *Swanton Courier*, *St. Albans Messenger*, and *Barre Daily Times*.<sup>95</sup>

By October, these fears were realized, and events moved quickly. The *Burlington Free Press* reported, “It is expected that the Lumière North American Company, Ltd., will close its business here within a month and will remove to New York City. . . . [T]he goods which they have manufactured in America can be imported as cheaply from Lyons, France. . . . Captain Claudius Poulailhon, the United States manager, will have his office at No. 75 Fifth Avenue . . . where they will devote themselves entirely to the moving picture end of the business.”<sup>96</sup> A similar report appeared in the *Bethel Courier*.<sup>97</sup> This was followed on October 18 by a description in the *Burlington Daily News* of a farewell luncheon “for the forewoman, Mrs. A. M. Robinson, in anticipation of her pending departure for New York, where she will continue her connections with the Lumière Co.”<sup>98</sup> By the end of the month, some of the factory fittings were being dismantled. The *Burlington Free Press* advertised for sale “Nine Copper Vats” from the Lumière plant.<sup>99</sup> The Wilmington, Vermont, newspaper described the final days at the plant: “It is now thought that the Burlington branch of the Lumière Co. of America will be completely

transferred to New York in another week, and the plant at Burlington closed. The staff which has remained at Burlington will be busy for another week filling some of the orders which were on hand. Some of the officials and families have already gone to New York and the others will follow soon.”<sup>100</sup>

As the Lumière plant shut down, the staff who remained in Burlington would reshape their lives. On October 30, 1911, “a linen shower was tendered Miss Alma Leduc at her home on Rose Street on Friday evening by 25 of her friends from the Lumière company, in honor of her approaching marriage.”<sup>101</sup> The story noted that a “flashlight picture” of the event was taken by F. H. Tims. Perhaps this keepsake still remains somewhere in a family album, unrecognized as a record of women workers who were pioneers in the production of photographic materials.

For another few years, the shuttered factory remained the property of the Lumière Company. The annual license fee to the State of Vermont of \$50, paid by the Lumière North American Company as a corporation of another state (i.e., Lyon, France), is recorded in 1911. In 1912, the Lumière-Jougla company of Paris appeared in the Burlington records for the first time, submitting payment of a \$66.67 annual fee.<sup>102</sup>

In the years that followed, the Lumière Company was able to recover only a fraction of their North American investments. In May 1914, the property in Burlington was sold at auction to J. J. Flynn, one of only two bidders, for a mere \$17,000. The 32-acre plot of land, with 40 rods of lake frontage, railroad tracks, and sewer line, was assessed on the tax list at \$150,000 and the Lumière Company had expended some \$258,000 on multiple buildings and the water intake and pump essential to the plant.<sup>103</sup>

In 1915, *Photo Era*, *The American Journal of Photography* reported on a further change for the company. “Mr. R. J. Fitzsimons announces that he has purchased the entire stock of the Lumière-Jougla Company and the sole United States agency for their Autochrome plates for direct color photography, also their dry plates and chemicals for several years to come. Mr. F is to be congratulated upon representing this well-known firm and it is to be hoped that the supply of these goods will meet the constantly increasing demand.”<sup>104</sup>

By this time the First World War had begun to sweep across Europe, and war coverage was the primary focus of news media for four long years. Photography was more important than ever. For the first time, war events were captured in true color, accurately showing the participation of soldiers from Algeria, India, and Sub-Saharan Africa alongside European soldiers, as well as the daily life and death of trench warfare. The immediacy of humanity in crisis needed color, and Autochrome was there to record the full impact of war.

Although World War I disrupted the supply of Autochrome plates, as



indicated in the photography publications of the day, avid photographers continued to capture images that celebrated ordinary life, and to debate matters such as the best development techniques to ensure long-lasting Autochrome photographs. Many of these photographs survive and offer today an accurate record of the diversity of life in the early twentieth century. In *Photo Era* magazine alone there were three articles about Lumière Autochrome between January and June 1917. The renowned photographer Henriette Hudson of New York City used Autochrome to reflect the city through her artistic eye.<sup>105</sup> Fellow Autochrome enthusiast George H. Lane of York, Pennsylvania, who in 1907 had recorded “a graceful group of American and Argentine flags” using some of the first Lumière Autochrome plates sold in the United States, now could prove to fellow photographers that the image was stable even ten years after his trip to South America.<sup>106</sup>

In the same volume of the magazine, A. E. Churchill described how easy it was for him to bring his camera on a picnic to the country, and to make natural color Autochromes. His statement captured the carefree moment of this amazing inventiveness that would liberate people from the drudgery and complexity of studio photography and earlier darkroom technology. In this new promised world it was easy to capture the moment.

A short trolley ride, a ferry across a river, another short ride . . . we alighted at the crossing of a country road, passing on the way to the farm . . . a gorgeous tapestry of nature’s weave and color selection. . . . [E]arly autumn had touched the sumac as with a brush of brilliant scarlet. Ringing the edges of the fields, little wild asters nodded their blue-capped heads, flanked by patches of yellow golden rod. . . . [W]hat a day for a riot in Autochrome among this kaleidoscope of brilliant colors!<sup>107</sup>

Across the country, this became the norm. Photography was democratized: While the artist could reach new creative heights, and the journalist captured historic events for posterity, the average person could just take their camera, and with an Autochrome plate, record the common events of daily life in true color. Despite the ongoing war, some photographers felt that the tenth anniversary of the commercial release of Autochrome deserved recognition. *Photo Era* promoted the idea of national displays of Autochrome photographs as a form of “Honoring Lumière” and honoring the bond with France.<sup>108</sup> While stories like this were no doubt of interest to individual subscribers, the city of Burlington was no longer involved.

While the Lumière-Jougla company was on the rise, reminders of the Lumière North American Company began to disappear from Burlington’s business community. The 1911 *Burlington City and Winooski Directory* listed the factory but added that it was “temporarily closed.”



*Drone aerial photograph of Lumière North American Factory, looking south: engine room and boiler house. The top structure holds the 5,000-gallon water tank and the cooling tower. The smokestack is in the foreground. Photo: Paul Gittelsohn. Screenshot from *It's All in the Plate*, (c. 2018) by Rise Up Filming, LLC. John Summa, Producer and Director; Paul Gittelsohn, Director of Photography. Courtesy of John Summa, Rise Up Filming.*

The 1912 directory simply listed the company as “closed.”<sup>109</sup> When J. J. Flynn purchased the factory site in 1914, the newspaper headline read, “Howard Park Sold.”<sup>110</sup> The same headline was used again a few months later when Flynn sold the property to Vermont Hardware.<sup>111</sup> Although the name Lumière North American Company remained on the property in the 1918 Sanborn Fire Insurance Atlas, the process of forgetting had begun. Forgotten, the promising travels of Auguste Lumière to the scientific dinners in Philadelphia. Forgotten, the work of the skilled laborers who made a product that equaled or surpassed the quality of the plates produced in Lyon.

The last news article of this era in Vermont to mention the Burlington Lumière North American Co. was a glancing reference in the 1913 story of an episode that took place in New York City. Martha Poulaillon, the daughter of Charles (formerly known as Claudius) Poulaillon and a recent graduate from Wellesley College, reported an attempted assault by her dentist. The story was picked up in the *Barre Daily Times*.<sup>112</sup> In the article, Martha Poulaillon’s father was described as “[the] owner of the Lumière Jougla Plate company of New York and Paris, with headquarters at 75 Fifth Avenue” and it indicated that “The family moved from Burlington, Vt., to New York, where her father has an extensive business.” The Burlington press, however, was silent. There was no mention of the dry-plate works, and silence filled the manufactory building.

Today we are annually fascinated with the changing fall colors of Vermont. How appropriate that a century ago, the Lumières' Autochrome process first offered photographers the means to capture this seasonal drama:

The time is again at hand to perpetuate, by means of Autochromes, the glorious autumnal coloring that glorifies American scenery in New England and elsewhere. As the Autochrome method of color photography has been relieved of its former technical difficulties and is now simplicity itself, its devotees will add plates of new and beautiful effects to their collections.<sup>113</sup>

People today may take for granted the ability to capture the colors of the world around us, but we owe a debt of gratitude to the Lumières, and can look with new eyes at their factory building in Burlington, Vermont, where the age of color photography began.

## NOTES

My thanks to Eloise Beil for masterful edits, research support, and many shared projects.

<sup>1</sup> "Lumière Film Festival," [https://en.wikipedia.org/wiki/Lumi%C3%A8re\\_Film\\_Festival](https://en.wikipedia.org/wiki/Lumi%C3%A8re_Film_Festival). Last updated 8 October 2020. Accessed April 23, 2021. "Il y a 120 ans, Québec découvrait le cinéma," <https://www.lesoleil.com/arts/cinema/il-y-a-120-ans-quebec-decouvrait-le-cinema-810ce3b89ffc649b9ec88dab8b3085>. Last updated 29 September 2016. Accessed April 23, 2021.

<sup>2</sup> Hallenbeck, Brent. "Vermont Brewer Announces Move to Burlington." *Burlington Free Press*, 11 April, 2021, 7B.

<sup>3</sup> Michael Sherman, Gene Sessions, and P. Jeffrey Potash. *Freedom and Unity: A History of Vermont* (Barre: Vermont Historical Society, 2004), 287-92.

<sup>4</sup> *The British Journal of Photography* 57 (3 June 1910), 46.

<sup>5</sup> Jean-Marc Lamotte, Société Lumière, patrimoine historique non-film, interview by author, Lyon, France, 17 October, 2019.

<sup>6</sup> "Louis Daguerre," [https://en.wikipedia.org/wiki/Louis\\_Daguerre](https://en.wikipedia.org/wiki/Louis_Daguerre). Accessed July 6, 2019.

<sup>7</sup> "File: Boulevard Du Temple.jpg," [https://en.wikipedia.org/wiki/File:Boulevard\\_du\\_Temple.jpg](https://en.wikipedia.org/wiki/File:Boulevard_du_Temple.jpg). Accessed July 6, 2019.

<sup>8</sup> James Junius Marks, ed., *The Peninsular Campaign in Virginia: Incidents and Scenes* (Philadelphia: J. B. Lippencott, 1864): 383 and 420 discuss captured soldiers carrying daguerreotypes of loved ones in their belongings. United States War Department Library, ed. *List of the Photographs and Photographic Negatives Relating to the War for the Union*. (Washington, DC: Government Printing Office, 1897). This book lists thousands of photographic cards and negatives taken during the conflict, including images by Matthew Brady, the Army Corps of Engineers, and others.

<sup>9</sup> "To Our Readers," *Scientific American* 5:8 (1861): 127-28. <https://doi.org/10.1038/scientificamerican08241861-127>. Accessed January 15, 2021.

<sup>10</sup> "Auguste and Louis Lumière," [https://en.wikipedia.org/wiki/Charles\\_Antoine\\_Lumiere](https://en.wikipedia.org/wiki/Charles_Antoine_Lumiere). Accessed January 15, 2021.

<sup>11</sup> "Les Lumières, Lyonnais D'adoption," Généalanille, May 14, 2014, <https://genealanille.fr/blog/2014/05/14/les-lumiere-lyonnais-d-jeanne-claudine-audette-lumiere>, Accessed January 19, 2021. "Auguste and Louis Lumière," [https://en.wikipedia.org/wiki/Charles\\_Antoine\\_Lumiere](https://en.wikipedia.org/wiki/Charles_Antoine_Lumiere), Accessed July 30, 2019.

<sup>12</sup> *Photography at the Paris International Exhibition 1900, the Jurors' Report, Official Blue Book* (London: Messrs. Eyre and Spottiswoode, 1900). A detailed description of the Lumière plant at Lyon is found in this report.

<sup>13</sup> *Bulletin de La Société Astronomique de France et Revue Mensuelle* 22 (1908) comments on pictures of the sun and moon in color. Review of *Comptes Rendus des Séances de La Société de Biologie et de Ses Filiales, Société de Biologie* 1 (1907) focused on the use of Autochrome in photomicrography.

<sup>14</sup> Natasha Geiling, "Color Photographs of Imperial Russia Reveal a World Lost to History," *Smithsonian*, March 2014, <https://www.smithsonianmag.com/author/natasha-geiling/?page=14>. Accessed June 28, 2021. "Sergey Prokudin-Gorsky," <https://en.wikipedia.org/wiki/Prokudin-Gorskii>. Accessed February 12, 2021.

<sup>15</sup> "Exposition Universelle (1900)," [https://en.wikipedia.org/wiki/Exposition\\_Universelle\\_\(1900\)](https://en.wikipedia.org/wiki/Exposition_Universelle_(1900)). Accessed April 23, 2021; *Photography at the Paris International Exhibition 1900, the Jurors' Report, Official Blue Book*. (London: Eyre and Spottiswoode, 1900), quoted in the *British Journal of Photography* 48 (1901): 59, 338.

<sup>16</sup> *Ibid.*, 338. See note 22, below, for clarification about the identities of E. L. White and F. J. White.

<sup>17</sup> "Trade Notes," *The Photographic Times* 33 (1901): 237.

<sup>18</sup> "Dingley Act," [https://en.wikipedia.org/wiki/Dingley\\_Act](https://en.wikipedia.org/wiki/Dingley_Act). Accessed February 19, 2020. "Wilson-Gorman Tariff Act," [https://en.wikipedia.org/wiki/Wilson%E2%80%93Gorman\\_Tariff\\_Act](https://en.wikipedia.org/wiki/Wilson%E2%80%93Gorman_Tariff_Act). Accessed November 1, 2019.

<sup>19</sup> *The Photographic Journal* 33 (1909).

<sup>20</sup> *National Newspaper Directory and Gazetteer* (Boston: Pettingill's Newspaper and Gazetteer, 1903), 596.

<sup>21</sup> *The New Photo-Miniature* 3, no. 2 (1901): 31-36, new plant announced. *The Photographic Journal* 33 (1909) reported that in 1904 the firm had been established in Burlington "to work in North America, and avoid the heavy custom duties."

<sup>22</sup> "Trade Notes," 237. E. Llewellyn White and Franklin J. White (E. L. White and F. J. White, respectively) were brothers, and both were managers for Lumière North American. Reporting on an interview with "Manager F. J. White of the Lumière North American company, Limited [sic]," the *Burlington Free Press* of December 2, 1901, stated, "Mr. White has come to Burlington to reside, and will at once complete the preliminary arrangements for the erection of the manufactory . . . in August Manager White and his brother, E. L. White, manager of the company in London, visited Burlington." After the initial visit to Burlington in 1901, subsequent references in this article to "White" refer to Frederick J. (F. J.) White.

<sup>23</sup> *St. Johnsbury* (VT) *Caledonian*, 1 December 1901, 7.

<sup>24</sup> *The Photographic Dealer and D. and P. Review* 10-11 (1901): 109.

<sup>25</sup> *The Herald and News* (West Randolph, VT), 23 January 1902, 5.

<sup>26</sup> *Burlington* (VT) *Weekly Free Press*, 30 January, 1902, 8. This is the only reference to J. A. Poulailon found in the Vermont records; as of February 1902, M. Claudius Poulailon, engineer, was hired as "master of works." In subsequent records he is also referred to as Captain Claudius Poulailon and Charles Poulailon.

<sup>27</sup> *Herald and News*, 13 February 1902, 5.

<sup>28</sup> *St. Johnsbury* [VT] *Caledonian*, 12 February 1902, 7.

<sup>29</sup> *Burlington City and Winooski Directory* (Greenfield, MA & Bellows Falls, VT: H. A. Manning Company Publisher, 1906). Manning's *City Directory* of 1906 refers to this part of Burlington as Lumière Park: "the area previously known as Howard Park . . . simply as Lumière Park."

<sup>30</sup> *The Iron Age*, 69 (13 March 1902): 31.

<sup>31</sup> *Orleans County Monitor* (Barton, VT), 21 April 1902, 2.

<sup>32</sup> *The Metal Worker* 58, no. 20 (1902): 52.

<sup>33</sup> *Barre* (VT) *Evening Telegram*, 7 December 1901, 1.

<sup>34</sup> *Burlington Weekly Free Press*, 9 October 1902, 8.

<sup>35</sup> *City of Burlington Book of Deeds*, 51 (1903): 44-68. Special thanks to Mary O'Neil, City of Burlington historical architect, whose knowledge of the historic book of deeds resulted in finding the original document. I am deeply indebted to her for her support and assistance.

<sup>36</sup> *Burlington* (VT) *Free Press*, 29 October 1903, 8. "Mr. and Mrs. Claudius Poulailon have just returned from France, where they have been for the past five months. While there it is claimed Mr. Poulailon secured a large amount of machinery for the company, which has been shipped and will soon arrive. As soon as it arrives it is claimed it will be installed and the factory started."

<sup>37</sup> *American Manufacturer and Iron World* 74, no. 14 (1904): 450; *American Machinist* 25 (1902): 602.

<sup>38</sup> *Herald and News*, 5 May 1904, 5.

<sup>39</sup> *Middlebury* (VT) *Register*, 22 July 1904, 1.

<sup>40</sup> "Architect Sued," *Barre* (VT) *Daily Times*, 9 May 1903, 1.

<sup>41</sup> A detailed summary of *White v. Lumière North American Co.* is found in *The Atlantic Reporter*, 64: 1121-1127. <https://babel.hathitrust.org/cgi/pt?id=uiug.30112054331696&view=1up&seq=1145&q1=1121>. Accessed January 16, 2021.

<sup>42</sup> *Herald and News*, 14 January 1904, 5.

<sup>43</sup> *Ibid.*

- <sup>44</sup> *Barre (VT) Daily Times*, 19 December 1903, 1.
- <sup>45</sup> *Middlebury Register*, 11 December 1903, 1; *Burlington Free Press* 24 December 1903, 8.
- <sup>46</sup> *Herald and News*, 14 January 1904, 5. In Burlington, the cold snap was less extreme but still noteworthy; the record low for 1904 of 18 degrees below zero was recorded on January 19. "Burlington—Lowest Temperature Each Year" Current Results.com, <https://www.currentresults.com/Yearly-Weather/USA/VT/Burlington/extreme-annual-burlington-low-temperature.php>. Accessed June 23, 2021.
- <sup>47</sup> *Herald and News*, 14 January 1904, 5. The *St. Johnsbury Caledonian* reported a ruling that Mr. White was not owed a salary, and the attachment had been reduced to a "bond of \$7,000," allowing the company to "commence business at once and give employment to 200 hands." *St. Johnsbury Caledonian*, 13 January 1904, 7. White continued to press his claim at least into 1907, when the *Herald and News* noted: "Frederick G. [sic] White, former superintendent of the Lumière North America Co.'s business, attached the plant at Burlington November 7, in an attempt to recover \$20,000 damages for malicious prosecution. White three years ago was arrested of a body writ for \$22,000 at the instance of the company, as he claims, without cause." No further news followed, so it seems White's final claim never prospered. *Herald and News*, 14 November 1907, 3.
- <sup>48</sup> *The Atlantic Reporter* 64 (1906): 1121-1127.
- <sup>49</sup> *City of Burlington Book of Deeds* 51 (1903): 44-68.
- <sup>50</sup> R. Child Bayley, "The Pictorial Aspect of Photography in Colors," *Camera Work* 2 (1903): 42.
- <sup>51</sup> *The British Journal of Photography*, 7 (1910): 46.
- <sup>52</sup> *American Photography* 33 (1909): 144.
- <sup>53</sup> *Inland Printer* (1910): 252.
- <sup>54</sup> *The Professional and Amateur Photographer* 9 (1904): 211.
- <sup>55</sup> Charles Edwin Allen, *About Burlington Vermont* (Burlington, VT: Hopart J. Shanley & Company, 1905), 58.
- <sup>56</sup> *The New Photo-Miniature* 7, no. 3 (1907): 495.
- <sup>57</sup> <http://www.luminous-lint.com/app/image/30456965658563007962301/>. Accessed January 25, 2021.
- <sup>58</sup> *The Archives of Physiological Therapy*, 1 and 2 (1905): 246.
- <sup>59</sup> "Alfred Stieglitz," [https://en.wikipedia.org/wiki/Alfred\\_Stieglitz](https://en.wikipedia.org/wiki/Alfred_Stieglitz), last modified 11 April 2019. Accessed January 17, 2021.
- <sup>60</sup> Weston J. Naef, *The Collection of Alfred Stieglitz: Fifty Pioneers in Modern Photography*. (New York: The Metropolitan Museum of Art/Viking Press, 1978), 162.
- <sup>61</sup> *The New Photo-Miniature* 7, no. 3 (1907): 494. Elsewhere in the same publication the editors surmise that after Stieglitz's success with Autochrome "Lumière color photography will be in full swing in America within a year of its appearance in Europe" *Ibid.*, 541.
- <sup>62</sup> *Ibid.*
- <sup>63</sup> F. Morris Steadman, "Color Photography with Lumière Autochrome Plate," *Camera Craft* 14, no. 9 (1907): 398. A Burlington street directory of 1903 shows that Mr. Gates lived at 230 Pearl Street which, if numbering has not changed, was at the Northwest corner at S. Williams Street.
- <sup>64</sup> *Ibid.*, 396.
- <sup>65</sup> *The Camera and Darkroom* 8 (1904): 274.
- <sup>66</sup> *The Photographic News* 52 (1907): 549.
- <sup>67</sup> *The Photo Era* 39 (1917): 266. The dinner with Antoine Lumière was also reported in "Editor's Table," *Wilson's Photographic Magazine* 45 (1908): 47; and in *The Camera* (1908): 27.
- <sup>68</sup> *The Camera* 12 (1917): 27. *The Camera* was published in Philadelphia under various subtitles through July 1953. "The Camera (American Magazine)," [https://en.wikipedia.org/wiki/The\\_Camera\\_\(American\\_magazine\)](https://en.wikipedia.org/wiki/The_Camera_(American_magazine)), last updated 25 May, 2021, accessed June 25, 2021.
- <sup>69</sup> *The International Steam Engineer* 13-14 (1908): 45.
- <sup>70</sup> J. P. [James Petrie] Chalmers, "Seeing is Believing," *American Photography* 1 (July 1907): 210. *American Photography* was formed in 1907 through the merger of *American Amateur Photographer*, *Camera and Dark Room*, and *Photo-Beacon*. [http://camera-wiki.org/wiki/American\\_Photography](http://camera-wiki.org/wiki/American_Photography). Accessed June 29, 2021.
- <sup>71</sup> *American Photography* 1, no. 5 (November 1907): 268.
- <sup>72</sup> *Down-Town Topics* 6, no. 6 (December 1907): 365.
- <sup>73</sup> See, for example, *American Photography* 2 (1908): 711, for an announcement that Lumière Autochrome Plates are available for "direct color photography," listing the only two points of production: Lyon, France, and Burlington, Vermont.
- <sup>74</sup> *Wilson's Photographic Magazine* 45 (1908): 191.
- <sup>75</sup> *American Photography* 2: 711.
- <sup>76</sup> *Barre Daily Times*, 29 February 1908, 3.

- <sup>77</sup> *Burlington Free Press*, 13 April 1908, 8; 15 April 1908, 8; 16 April 1908, 7.
- <sup>78</sup> *Burlington Free Press*, 15 April 1908, 8.
- <sup>79</sup> For example, "Comptes Rendus des Séances de La Société de Biologie et de Ses Filiales," *Société de Biologie* 1 (1907) described the use of Autochrome in photomicrography.
- <sup>80</sup> *Middlebury Register*, 29 January 1909, 4.
- <sup>81</sup> *Herald and News*, 25 March 1909, 7.
- <sup>82</sup> *News and Citizen* (Morrisville, VT), 9 June 1909, 5.
- <sup>83</sup> *Middlebury Register*, 23 July 1909, 2.
- <sup>84</sup> *Bristol Herald*, 30 December, 1909, 7.
- <sup>85</sup> Nancy Gallagher, *Breeding Better Vermonters* (Hanover, NH: University Press of New England, 1999), 31.
- <sup>86</sup> *Bristol Herald*, 30 December 1909, 7.
- <sup>87</sup> *Barre Daily Times*, 23 December 1909, 7.
- <sup>88</sup> Helena Rutherford Ely, "Color Arrangement of Flowers," *Scribner's Magazine* 48 (1910): 292. Launched in 1887, *Scribner's* was the first magazine to introduce color illustrations. "Scribner's Magazine," [https://en.wikipedia.org/wiki/Scribner's\\_Magazine](https://en.wikipedia.org/wiki/Scribner's_Magazine). Accessed June 29, 2021.
- <sup>89</sup> "The Salisbury Wreath to King Edward," *The British Journal of Photography* 57 (1910): 435.
- <sup>90</sup> *Ibid.*, 552.
- <sup>91</sup> *Barre Daily Times*, 4 August 1910, 1. (Note: according to the *Dictionary of American Regional English*, "barge" in this context refers to a horse-drawn wagon used for transporting a large number of people: <https://www.daredictionary.com>. Accessed April 24, 2021.
- <sup>92</sup> *Barre Daily Times*, 1 October 1910, 6.
- <sup>93</sup> "Tariff hearings before the Committee . . . Sixtieth Congress" (United States Congress, House Committee on Ways and Means of the House of Representatives, 1908-1909, U.S. Government Printing Office, 1909): 247. The "Gelatin and Glue" section of the hearings includes the testimony of K. Kuhn, vice president of Defender Photo Supply Co., in which he provided detailed discussion of the technical issues and costs. [https://books.google.com/books?id=\\_ksAAAAAYAAJ&pg=PA247&dq=tariff+import+photographic+%22united+states%22%22present+gelatin+is+taxed+together+with+glue+%22&hl=en&sa=X&ved=2ahUKEwjibici11efkAhXOnuAKHb8gBkwQ6AEwAXoECAAAQAg#v=onepage&q&f=false](https://books.google.com/books?id=_ksAAAAAYAAJ&pg=PA247&dq=tariff+import+photographic+%22united+states%22%22present+gelatin+is+taxed+together+with+glue+%22&hl=en&sa=X&ved=2ahUKEwjibici11efkAhXOnuAKHb8gBkwQ6AEwAXoECAAAQAg#v=onepage&q&f=false). Accessed June 30, 2021.
- <sup>94</sup> *Burlington Free Press*, 8 September 1911, 7. The rumored move to Paris had some basis in fact. While the Lumière headquarters and factories for photographic manufacturing would continue in Lyon, their partnership with the Jougla firm of Paris went into effect in 1911.
- <sup>95</sup> *Swanton Courier*, 14 September 1911, 2; *Barre Times*, 12 September 1911, 7; and *St. Albans Weekly Messenger*, 21 September 1911, 2.
- <sup>96</sup> "Lumière Company Going," *Burlington Free Press*, 10 October 1911, 7.
- <sup>97</sup> *Bethel Courier*, 19 October 1911, 7.
- <sup>98</sup> *Burlington Daily News*, 18 October 1911, 5.
- <sup>99</sup> "Nine Copper Vats," *Burlington Free Press*, 25 October 1911, 11.
- <sup>100</sup> *Deerfield Valley Times* (Wilmington, VT), 27 October 1911, 3.
- <sup>101</sup> *Burlington Free Press*, 30 October 1911, 8.
- <sup>102</sup> *The Biennial Report of the Treasurer for the Two Years Ending June 30, 1912*, (City of Burlington, 1913), 185.
- <sup>103</sup> *Burlington Free Press*, 19 May 1914, 7.
- <sup>104</sup> *Photo Era* 34 (1915): 58.
- <sup>105</sup> *Ibid.*, 28 (1917): 205.
- <sup>106</sup> *Ibid.*, 305.
- <sup>107</sup> *Ibid.*, 236.
- <sup>108</sup> *Ibid.*, 247.
- <sup>109</sup> *Burlington City and Winooski Directory*, (Burlington, VT: L. P. Waite Publishers, 1912).
- <sup>110</sup> "Howard Park Sold," *Burlington Free Press*, 19 May 1914, 7.
- <sup>111</sup> "Vermont Hardware," *ibid.*, 8 August 1914, 8.
- <sup>112</sup> *The Barre Daily Times*, 1 May 1913, 7.
- <sup>113</sup> *Photo Era* 28 (1917): 270.