In recent histories of early photography, the quest for the reproduction of color is often framed as resulting from a disappointment with the new medium’s lack of ability to do so. A brief look at early writings from within the photographic community tells us that, rather than voicing disappointment, practitioners and scientists stated the absence of color matter-of-factly, describing what the images looked like to those not yet acquainted with them. While colors were not reproduced on a larger scale until the Lumière brothers patented the autochrome technique in 1903, the expectation that photography would eventually be able to do so was there right from the start. As early as 1841, the English scientist and pioneering photographer Robert Hunt published a treatise on fixing photographic images on papers colored with diverse chemicals. His experiment with silver nitrate had “the most pleasing result of bringing within the range of probabilities, the reproduction of photographic pictures in their natural colours.” Eight years later, the American Henry Hunt Snelling published a synopsis of Hunt’s treatise in his History and Practice of the Art of Photography (1849), relating the Englishman’s findings to the reproduction of color as an ongoing scientific endeavor, from which he expected a positive outcome in the long run:

Some advances have been made towards producing photographic impressions in color [...] The day may still be remote when this much to be desired desideratum shall be accomplished in portrait taking; but I am led to hope that future experiments may master the secret which now causes it to be looked upon, by many, as an impossibility.

Snelling’s phrasing is a typical instance of the German historian Reinhart Koselleck’s reconceptualization of progress as dynamically interrelated “horizons of expectation and spaces of experience.” While Snelling anticipated color at the horizon of the emerging technology for the applied context of portrait photography, painting and hand tinting constituted a “lived space of experience” in the photographic portrait production of his time. Hence, until color reproduction materialized, photographers would be instructed in a correct and above all tasteful manner of hand coloring,

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*Photography’s Past Futures*

The Transparency of Color: Aesthetics, Materials, and Practices of Hand Coloring Photographs between Rochester and Yokohama

*Ann-Sophie Lehmann*
and Snelling’s chapter “The Probability of Producing Colored Pictures by the Solar Radiations” is followed by instructions “On Coloring Daguerreotypes,” though in general he doubts “the propriety of coloring the daguerreotype” and thinks most results “absolutely disgusting.”

This apparently contradictory attitude reflects the friction between photographic ideals (including the expectation of the accurate reproduction of color) and actual practices, a friction frequently expressed in contemporary writings. François Arago, for example, famously compared the daguerreotype’s fragility, iridescence, and precision to butterfly wings and manual coloring to a sign painter crudely smearing over this delicate invention of nature. Yet it is exactly through the comparison of black-and-white pictures to vivid butterflies that the desire for color becomes palpable: more than anything else, monochrome butterfly wings beg to be colored. Arago himself, who owned a large collection of exotic butterflies, must have been acutely aware of this flaw in his beautiful metaphor, exemplified here in the portrait of an anonymous collector (fig. 1). Therefore, as soon as photographs had assumed stable material formats that allowed for standardized production and sale, hand tinting became a fact despite the purist convictions voiced by Arago and others. Hand-tinted photography far surpassed the autochrome, and it remained an easy and cheap way to enhance black-and-white

Fig. 1. Butterfly Collector, Portrait of a Man, ca. 1850, daguerreotype, 7.0 × 8.2 cm (2 3⁄4 × 3 1⁄2 in.). Rochester, New York, George Eastman House, International Museum of Photography and Film (GEH NEG: 5651). Courtesy of George Eastman House, International Museum of Photography and Film
images until color photography became available to a wide consumer market in the 1940s. Interestingly, while color was certainly meant to heighten photography’s reference to reality, the exact relation between the referent and its color seems of secondary relevance to the practice. For instance, rather than recommending observation of the colors of a photographed model, Snelling urges the daguerreotype painter to visit artists’ studios and art galleries to study “various styles of coloring.”11 Another contemporary source even distinguishes between the styles of different colorists.12 Accordingly, the many handbooks that would follow Snelling’s discuss the coloring of daguerreotypes (and soon after, of photographs on paper) as an art and craft for which the nature, light-fastness, and transparency of color materials, the preparation of the surface, and the application of the colors were just as important as the questions of which colors were suitable for a particular pictorial element and of how hand coloring would shift the photograph from the domain of reproduction to that of art. Hand coloring also provided for a new line of employment in photography studios and stimulated manufacturers of photographic materials to develop and market special photographic colors from the 1850s onward.13

Snelling’s *History and Practice of the Art of Photography* thus demonstrates that the expectation of and experimentation with color “in the camera”14 was closely intertwined with the practice of manual coloring. Historical studies of early photography, however, have separated these strands and generally present what seems like two distinct histories: a dominant strand that tells about the diverse chemical procedures developed throughout the nineteenth and early twentieth centuries to generate photographs in color, and a marginal strand that describes the coloring of photographs with watercolors, oil, or pastels. This article aims to show that the precise intersection between these histories is extremely important for the study of color in early photography. Apart from the photographs themselves, an important source for research into these convergent histories are how-to manuals such as Snelling’s, which in many cases were commissioned by manufacturers of either photographic equipment or artistic materials.15

The collections of the Getty Research Institute hold a particularly remarkable how-to manual, an inconspicuous booklet titled *Peerless Japanese Transparent Water-Colors*, first published by Charles F. Nicholson in 1902 and, according to the title page, to be used for “the artistic tinting of photographs, lantern slides, half-tones, magazine prints and process work of all kinds where a perfectly transparent color is required” (figs. 2, 3).16 Printed in several editions, the manual is not unique in terms of quantity but entirely exceptional in its genre because it contains not only instructions on how to color but also the materials to do so. Following the pages with instructions, the colors are pressed in a dry film on fifteen single sheets of paper in as many tints, ranging from “Brilliant Yellow” to “Pearl Gray.” Each color is accompanied by a short text that stresses the particular characteristics and applications of the color (figs. 4, 5). Small strips of the color sheets are to be cut and dissolved in water, after which the paper can be removed, leaving the colors ready to use. A closer look at this literally colorful manual, its maker, and its context provides new insights into the chemistry and aesthetics of hand-coloring.
Fig. 2. Cover. From Charles F. Nicholson, *Peerless Japanese Transparent Water-Colors* (Boston, New York, and Tokyo: Japanese Water-Color Co., 1902), paper, 20 × 8 cm (8⅞ × 3¼ in.). Los Angeles, Getty Research Institute (86-b26647)

Fig. 3. Title Page. From Charles F. Nicholson, *Peerless Japanese Transparent Water-Colors* (Boston, New York, and Tokyo: Japanese Water-Color Co., 1902), paper, 20 × 8 cm (8⅞ × 3¼ in.). Los Angeles, Getty Research Institute (86-b26647)
Figs. 4, 5. Instructions and color material for “No. 6 Japonica Scarlet.” From Charles F. Nicholson’s Peerless Japanese Transparent Water-Colors (Boston, New York, and Tokyo: Japanese Water-Color Co., 1902), paper and colorant, each page: 20 × 8 cm (8 7⁄8 × 3 1⁄4 in.). Los Angeles, Getty Research Institute (86-b26647)
photographs in the United States around 1900 and into a particular instance of the cross-cultural transmission of coloring effects and practices between the United States and Japan. Guided by the three adjectives of the booklet’s title—“peerless,” “Japanese,” and “transparent”—the following analysis serves as a lens through which we can review the relation between actual and applied color in early photography.

Compared to the photographic coloring materials commercially available at the time, Nicholson’s colors were doubtless marketed as “peerless” because of their format. The pressed material, as the accompanying text points out, leaves no residue on the tinted picture, distinguishing it from other available formats such as color cakes or bottled inks containing solvents. The booklet was also much lighter and easier to transport than the average coloring kit consisting of glass bottles with premixed colors. The attribute “transparent” seems an obviously desirable quality, because opaque colors would cover up the photo. Yet in the early history of coloring photographs, opacity and transparency were equally considered, and the preference for transparency only developed gradually, together with a particular photographic aesthetic and the chemical composition of the coloring media. As we will see later on, the transparency of Nicholson’s colors is directly related to their chemical make-up, just like their “self-blending” quality announced on the cover of the booklet (see fig. 2).

But let us first turn to the attribute “Japanese,” which seems far more mysterious than the other two. What was the advantage of having such Japanese colors, and were they really Japanese? The first page of the instructional text provides some general explanations, stating that “the art of transparent tinting had its origin in Japan and the wonderful skill of the Japanese artists in this line of work has excited universal admiration,” without providing any further information to support this claim. On the following pages, the hands-on process of coloring is explained using an engraving of George Boughton’s not-at-all-Japanese painting *The Pilgrim Exiles* (1875), a reproduction of which could be purchased by postal order for practice. Throughout the book, the colors’ Japaneseess is alluded to by a set of five Japanese characters that appears on several pages and vaguely translate the manual’s title; by the color “Japonica Scarlet” (“a very useful color for interiors, garments etc. and valuable in flower work,” see figs. 4, 5); and most decisively through the listing of “Tokio, Japan” between Boston and New York on the title page. While the two latter cities are complemented with a postal address, Tokyo is not.

A closer look at Charles F. Nicholson, the publisher and inventor of the colors, may shed some more light on their proposed Japanese origin. Nicholson is recorded as a dyer in the 1879 city directory of Rochester, New York, together with other family members who were painters, gilders, and dyers. George Nicholson, presumably Charles’s father, had come from England to Rochester, established the East Side Dye House on Kelly Street in 1870, and by 1872 sold his own “Nicholson’s blue aniline dye” for textiles. After their initial discovery in Germany in the 1830s and the first industrial production in England in the 1850s, synthetic, aniline-based dyes were produced in Germany, France, and England, and exported on a global scale. The bright colors
quickly conquered the textile and paint industries and had a profound impact on popular visual and material culture, including fashion, advertisements, and artificially colored flowers.\textsuperscript{22} They also played a key role in the development of the autochrome technology, as the potato starch particles enabling the process of selective color reproduction on a glass plate were dyed with aniline.\textsuperscript{23} Fueling the paint industry, aniline dyes found their way into the production of artists’ supplies as well. The industrial boomtown of Rochester counted a fair number of artists’ supply stores in addition to its textiles and paint industries.\textsuperscript{24} The Genesee Paint and Color Works, for instance, had the second largest artists’ materials stock in the state in the 1890s, after New York City.\textsuperscript{25} At the same time, Rochester became a prime location for the emerging photographic industry, prominently marked by the founding of the Eastman Company in 1889 (Eastman Kodak Company since 1892), in the wake of which a great number of photographic supply stores joined those for paint and artists’ materials.\textsuperscript{26} This local convergence of dyes, artists’ paints, and photography provided an ideal material, cultural, and economic environment for Nicholson to develop and launch his photographic colors.\textsuperscript{27} A Tokyo business or production location is not apparent from this context, leaving the question of the Japanese status of the colorants themselves an open matter.

The early editions of Nicholson’s manual give no information about composition or production, merely stressing that the manufacture of the film of “concentrated soluble color” is “prepared by a process known only to ourselves.”\textsuperscript{28} The 1928 edition contains an extensive warning against cheap imitations, most certainly directed against the Velox Transparent Water Color Stamps, which Eastman Kodak had brought to the market in 1914 and which mimicked Nicholson’s colors in every respect but added perforation marks that facilitated tearing of equal portions of paint matter.\textsuperscript{29} In Nicholson’s 1928 edition, “Tokio, Japan” has disappeared from the title page and “made in U.S.A.” is printed on the back cover.

A 1934 handbook for hand coloring photographs recommends Nicholson’s Peerless Japanese Water-Colors and Eastman Kodak’s rival Velox colors as the two leading aniline dye–based photo-coloring supplies, both for their easy and smooth application.\textsuperscript{30} Preliminary tests carried out by the Getty Conservation Institute on a 1928 edition of Nicholson’s colors confirm the synthetic origin of a number of colors.\textsuperscript{31} In fact, shortly after their development, aniline dyes had been identified as ideal colorants for albumen photographs due to their transparent shine and their affinity with the egg white–coated surface of the albumen photograph, on which they blended easily, rendering prior preparation of the photographic paper unnecessary.\textsuperscript{32} Henry Snelling had anticipated something like aniline in his 1849 handbook, confident that “some compound or ingredient may yet be discovered which […] will give a more delicate, pleasing, and natural appearance to the picture than is derived from the present mode of laying them on, which in estimation is more like plastering than coloring.”\textsuperscript{33} It is difficult to pinpoint the exact date for the first commercial sale of aniline dyes for coloring photographs, but in a 1859 photo-coloring manual published by London’s paint and photographic
supply manufacturer James Newman, Newman’s Photographic Colors are advertised as “prepared by a peculiar process” that makes them adhere easily while they “colour without hiding the photograph, giving a pure, brilliant and life-like effect.” A handbook that appeared seven years later recommended that “liquid colors, that is, the new Aniline colors are specially adapted for the tinting and coloring of albumen pictures; these colors flow very easily and the albumen surface requires no preparation,” and specified the colors manufactured by Newman. Somewhere in between, the use of aniline dyes for coloring photographs became a fact. Initially prone to fading, the dyes were constantly improved upon, and many new compounds were developed over the following decades, making a large spectrum of dyes available for Nicholson to use in formulating his colors.

Given the technical and historical circumstantial evidence, it can be safely concluded that Nicholson’s colors were not Japanese, in either origin or composition, and that the reasons for labeling them as such must be sought elsewhere. To find out, we have to return once again to the manual’s opening statement that the “art of transparent tinting had its origin in Japan and the wonderful skill of the Japanese artists in this line of work has excited universal admiration.” This vague allusion becomes more palpable when the launch of Nicholson’s colors is related to one of the largest and most expensive American book projects, undertaken a couple years earlier and still ongoing in 1902: the ten-volume *Captain Brinkley’s Japan: Described and Illustrated by the Japanese*, published by the J. B. Millet Company in Boston. A pinnacle of the American fascination with Japan, which had opened its borders in 1868, the collection was written by Western specialists in dialogue with Japanese historians, and each volume was bound in gilt fabric and lavishly furnished with original Japanese artworks, collotypes of flowers, and hand-colored and black-and-white photographs of Japanese customs, landscapes, and artworks. Between 1897 and 1904, at least sixteen different editions were issued in limited print runs ranging from 25 to 1,000 copies, adding up to 37,750 individual volumes. Depending on the edition, each copy was furnished with 30 to 60 full-page hand-colored albumen photographs and 200 smaller photographs throughout the text, amounting to at least 405,500 photographs colored by hand over a period of seven years. Such hand-colored photographs had first seen the light in Yokohama at the beginning of the Meiji period (1868–1912) and were initially manufactured by European photographers in collaboration with Japanese colorists and later produced in Japanese photography studios as well. Extremely popular among tourists and sojourners, these so-called “Yokohama shashin” (Yokohama photographs), which showcased famous Japanese views and typical customs, had initially returned to the United States in tourists’ private photo albums. *Brinkley’s Japan* made them available to everyone who could afford them, without having to travel to the Far East. To guarantee the customer an authentic Japanese experience nonetheless, it was absolutely vital that all materials used in the production of *Brinkley’s Japan* were truly Japanese, a fact extensively stressed in a sales prospectus and the introduction in the first volume. Concerning the photographs, the introduction specifies that they “are all made and colored by hand.
Fig. 6. A Japanese Artist at Work, hand-colored albumen photograph, image: 13.5 × 8.9 cm (5 5/16 × 3 1/2 in.). From Captain F. Brinkley, ed., Japan: Described and Illustrated by the Japanese, Edition de Luxe, vol. 1 (Boston: J. B. Millet Company, 1897–98), vi. Los Angeles, J. Paul Getty Museum (84.xb.878.1.1)
in Japan, over three hundred and fifty native artists have been specially engaged for 
this purpose,” and for visual support, a hand-colored photograph of a Japanese colorist 
at work is placed right next to the text (fig. 6). This, then, must have been the “art of 
transparent tinting” that Nicholson alluded to in his booklet.

Yet the connection between Nicholson’s colors and Brinkley’s Japan goes beyond 
the opportune association of a new product with these highly successful, fashionable, and 
abundantly produced pictures. A 1904 advertisement for Peerless Japanese Transparent 
Water Colors in the photo magazine Camera Craft again stresses — like the booklet 
itself — the “beautiful handiwork of Japanese artists in coloring photographs,” but adds 
a significant piece of new information: “it is not generally known that most of the work is 
now done in this country and the only medium used is the Japanese Transparent Water 
Colors.” The text further promises that the amateur will be able to equal the work of the 
Japanese artists and even earn money in doing so. In addition, it advertises “color tinting 
of every description” carried out at the “Japanese studio” at the New York branch of the 
Japanese Water Color Company, the address of which corresponds with that on the title 
page of the booklet (see fig. 3).

What are we to make of Nicholson’s claim that the Japanese photographs were 
not all colored in Japan? In fact, despite their material Japaneseness assured by the 
publisher, the Brinkley editions were assembled in Boston (the more expensive ones 
on subscription only). It would have made a lot of sense for the Millet Company to 
eventually contract for the coloring with a place nearby rather than having to order a 
ew batch of hand-colored photographs all the way from Yokohama whenever they were 
needed for the next volumes at hand. An involvement with the coloring of the Brinkley 
photos would explain not only the Boston address in the booklet but also why Nicholson 
marketed his colors with a distinct yet somewhat untraceable Japanese identity, 
so as to profit from the association while not compromising the Millet Company’s 
claim that coloring took place in Japan. Supporting the likely business relation with 
Millet, Nicholson’s how-to instructions betray an intimate knowledge of the Japanese 
coloring craft, which differed from Western approaches in one particular aspect. 
While Western photo-coloring manuals would advise the equal coloring of all picture 
elements, giving directions on how to color the face, hands, and hair and then moving 
on to clothing, landscape, and other requisites — just like painters’ manuals had done 
for centuries—Nicholson writes: “when objects in the picture are printed in a natural 
color, as, for instance, the bark of trees, an old fence, or a weather-beaten building, put 
no color on whatever.” Indeed, the subtle, pleasing aesthetic of Japanese hand-colored 
photographs is due to a selective form of coloring that highlights some picture elements 
and leaves out others. This principle, which can be traced back to Japanese woodblock 
prints, is nicely demonstrated by the colorist depicted in Brinkley’s Japan: the paint in 
his porcelain dishes is red, blue, pink, and green, but his face and hands, the screens 
in the back and — as if to emphasize their transformation from black-and-white into 
color — also the photos on his desk have remained untouched (see fig. 6). Contrary to
what the term suggests, selectiveness therefore achieves a pictorial unity by leaving some colors to the imagination or rather the visual experience of the viewer, who knows that skin is generally skin colored, stones gray, the bark of trees brown, and skies blue (relying on what cognitive psychology refers to as “memory color”), \(^{47}\) while other colors which cannot be deduced from visual experience, such as the colors of garments, are filled in. The partial absence of color is also important with regard to a question that may arise about the accuracy of hand coloring: did those colors represent the actual colors of the scenes of Japanese life recorded in the photographs? An advertisement by the Yokohama-based photographer Adolfo Farsari in an 1890 tourist guide claims that not only was his studio’s coloring artistically superior to that of Japanese studios, but “the colors were carefully noted at the time that the photographs of temples and other structures were taken, and we are the only ones who paint them as they really are.”\(^ {48}\) Yet it was exactly such structures of stone and wood that typically remained untouched in the photos. Farsari’s claim therefore attests less to actual coloring practice than to the indexical claim of photography and the imminent reproduction of color, which by the 1890s had moved considerably closer on the horizon of expectations. In hand tinting rather than reproducing what had been there, the authenticity of color resided in the transparency of the aniline dyes that allowed for the objects in the picture to remain visible underneath the film of colorant. And paradoxically, the authenticity of color in the Yokohama photographs was also supported by its very absence in particular picture elements, creating what could be described as an “ultimate transparency” of color.

Nicholson’s peerless, Japanese, transparent colors paved the way for Japanese style photo coloring in the West, not only regarding materials and aesthetics, but also practices: the advertisement of 1904 implied that the achievement of this “art of transparent tinting” was no longer restricted to Japanese artists alone but, with the help of Nicholson’s colors, was attainable for American amateurs as well. The manual’s “No. 4 Flesh Tint” attests to the different pictorial and cultural conventions the colors bridged: while in Japanese photographs, human skin was treated just like the bark of trees or an old fence and remained uncolored except maybe for a slight blush on cheeks and lips, in Western pictorial tradition the color of the flesh was considered the most important of all and, at the same time, the most difficult to re-create (figs. 7, 8).\(^ {49}\) This also applied to the craft of photo coloring, and its how-to manuals would inevitably start out with instructions on the coloring of faces, describing in great detail the various mixtures and grades of shading necessary to depict the skin of different sexes and ages. For instance, Snelling’s instructions on how to paint a face list no less than nine different pigments, applied in different combinations and intensities.\(^ {50}\) For Nicholson’s colors to succeed in an American market beyond the craze for Japanese hand-colored photographs, the inclusion of “No. 4 Flesh Tint” was paramount. Yet his instructions read as a compromise between the absence of flesh color in the Japanese tradition and its excessive application in the West, as Nicholson urgently warns the user to dilute the colors properly and to use a “weak wash” and little shading (see fig. 7). The application of aniline-based colors in a
Figs. 7, 8. Instructions and color material of “No. 4 Flesh Tint.” From Charles F. Nicholson, Peerless Japanese Transparent Water-Colors (Boston, New York, and Tokyo: Japanese Water-Color Co., 1902), paper and colorant, each page: 20 × 8 cm (8⅞ × 3¼ in.). Los Angeles, Getty Research Institute (86-826647)
“weak” manner also demonstrates that coloring materials are not intrinsically cultured but only become so in their diverse applications: the synthetic dyes, which have often been characterized as loud, garish, and therefore essentially “modern” colors, could also be used in a watered-down fashion to create an “authentically” Japanese impression.

A small testimony to a fascinating transcultural chapter in the history of hand coloring photographs, Nicholson’s Peerless Japanese Transparent Water-Colors therefore reveals the meaningful relations between actual materials, artistic practices, and cultural attributions. Nicholson’s colors were made Japanese not by substance or origin but rather through the practices and ensuing aesthetics with which they could be associated.

With regard to the separation between hand coloring and the reproduction of color in histories of early photography that I mentioned in the beginning of this article, the investigation of Nicholson’s colors has shown how hand coloring, and in particular the paradigm of transparency and its contingent aniline medium, worked toward a convincing representation of color that anticipated its mechanical reproduction. Such a convincing representation was not necessarily achieved through an accurate transcription of color from the scene in front of the camera to the photograph but by approximating a “natural” perception of color. Had François Arago known the transparent dyes and their effective partial applications in Japanese photographs, he may have thought differently about hand-painted butterfly wings. Taking up his metaphor one last time, it seems that when it came to color, photographs were indeed not entirely unlike butterfly wings. The latter are colored by a combination of two different phenomena: intricate patterns of scales that reflect light to cause so-called structural color and actual pigmentation of the wing surface. Similarly, photographs assumed color through different phenomena, materials, and procedures, which should be studied in conjunction, not in opposition.

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Notes
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7. Snelling, History and Practice, 76.
8. See for instance J. Zeigler, “Coloring Daguerreotypes,” The Photographic Art-Journal 2 (1851): 109–11, whose instructions are preceded by a comparable disclaimer: “Sir, I have often laid before you the opinion that heliographic impressions should neither be retouched [. . .] nor colored and yet you urgently ask me for a few lines upon colors applied to heliography” (109). On French sources doubting the value of hand coloring, see Lavédrine, Photographs of the Past, 30.
10. Arago donated the collection to the Perpignan Museum of Natural History in the same year that photography was patented; see J. Brémond, “Les papillons de la collection Dominique François Arago (1786–1853) du muséum de Perpignan,” Conflent 161, no. 5 (1989): 17–51.
11. Snelling, History and Practice, 133.
15. Henisch and Henisch, Painted Photograph, 38–39 and 99–100, list more than thirty manuals and instructional texts in journals in English, German, and French. See Hannavy, Encyclopedia, 177–87, for an annotated overview of photographic handbooks from 1840 to 1900. Snelling himself worked for one of the major manufacturers and suppliers of photography materials in the United States, Edward Anthony, to whom his treatise is dedicated and whose products are recommended throughout.
17. See, for instance, S. R. Lock, “Colored Photographs,” The Photographic and Fine Art Journal, April 1855, 111 (cited in Henisch and Henisch, Painted Photograph, 59): “By long experience I am convinced that the use of transparent colors—not of powder, chalks or oil—is alone conducive to the proper object in view.”

24. Stores are listed in the *Illustrated History of the Rochester Trades Assembly and the Building Trades Council* (Rochester, N.Y.: Boyd Press, 1897), 38 and 166.

25. *The Rochester Directory*, vol. 30 (1879), 38 and 166; and *Caspar’s Directory of the American Book, News and Stationery Trade, Wholesale and Retail* (Milwaukee: C. N. Caspar, 1889), 1225. Another large manufacturer was the Huntington Brothers, see *The Rochester Directory*, vol. 30 (1879), 3, 198; and listed with a different owner in *The Industries of the City of Rochester: A Résumé of Her Past History and Progress etc.* (Rochester, N.Y.: Elstner Publishing Company, 1888), 250.

26. See, for instance, the listings in *Illustrated History*, 73, 79, 105, and 109.


31. Fourier Transform Infrared Spectroscopy (FTIR) on a sample of the “Brilliant Yellow” related the spectrum to five synthetic color and ink samples in the Getty Coloring Material Database. Raman Spectroscopy on all colors again related the spectra of the “Brilliant Yellow” to yellow monoazo dye. Micro fading tests showed that all colors are light sensitive in similar ways as synthetic dyes. I am grateful to Dusan Stulik, Catherine Patterson, and Vincent Beltran of the Getty Conservation Institute for supporting my research.


36. See, for instance, Dr. Emil Jacobson’s *Chemisch-Technisches Repertorium*, vol. 38 (Berlin: Gaertner’s Verlagsbuchhandlung, 1899–1900), which gives detailed recipes and formulas for hundreds of
synthetic colorants and lists many more commercially available ones, for instance a water-soluble, yellow monoazo dye on page 20, like the one identified in Nicholson’s “Brilliant Yellow” (see note 31).


40. Bethel, “The J. B. Millet Company’s Japan,” 9 and appendix A.

41. For a concise yet nuanced overview, see Philip Ono, Unknown Japan: Reconsidering 19th-Century Photographs (Amsterdam: Rijksmuseum, 2008). See also Anne Lacoste, Felice Beato: A Photographer on the Eastern Road (Los Angeles: Getty Publications, 2010); and Eleanor M. Hight, Capturing Japan in Nineteenth-Century New England Collections (Farnham: Ashgate, 2011).


44. The advertisement appears on 339. A similar ad appears together with an article that summarizes the booklet’s text by C. F. Nicholson in Camera Magazine: An Illustrated Magazine Devoted to the Advancement of Photography 10 (1906): 52–53. In 1904, Down Town Photographic Topics, edited by the Obrig Camera Company, announced a demonstration of Japanese Transparent Water Colors, asking the reader to “bring a print and have it tinted with these new Japanese colors” on Monday, Dec. 5th, from 10 am to 5 pm, 165–67 Broadway (Down Town Photographic Topics 3, no. 5 [1904]).


50. Snelling, History and Practice, 131; for a typical recipe, see also [Anonymous], The Principles and Practice of Harmonious Colouring, “To Paint the Head,” 41–48.