EMANATIONS
The Art of the Cameraless Photograph

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“The realists (of whom I am one)... do not take the photograph for a ‘copy’ of reality, but for an emanation of past reality, a magic, not an art.”
—Roland Barthes

Stark white against a blue background, the spindly plant, a sprig of chamomile, strains upward, its flower petals spread as though reaching for the sun (FIG. 1). It’s a cyanotype contact photograph of this plant, made by a now-unknown amateur naturalist in about 1900. It was produced on postcard stock, with designated spaces for correspondence and an address printed on the back, thus allowing it to be sent to a friend or family member. The plant specimen would have been placed directly on the cyanotype paper before both were exposed to daylight. After an exposure of about fifteen minutes, an exact but ghostly impression of the stem, leaves, and flowers appeared, these opaque elements having prevented light from activating the cyanotype’s chemistry. The plant was then removed and the card washed with water to eliminate any unexposed iron salts, rendering the paper insensitive to light and fixing the image in place. The end result—part art, part science, and, let’s confess it, part magic—is a cameraless photograph.

Almost elemental in its simplicity, this kind of photograph is produced through a direct contact between the world and a piece of light-sensitive paper. Such photographs therefore reduce photography to its most essential feature: the reaction of a given surface to the absence and presence of light. Resulting in images that are both right up against the picture plane and floating in infinite depths, that are direct imprints of things but also disconcertingly stark abstractions, cameraless photographs invite a consideration of the nature of photographic representation in general. Unmediated by perspectival optics, photography is here presented as something to be looked at, not through, and to be made, not taken. After all, a cameraless photograph is not just of something; it is something. A reversed-tone inversion of the natural order of things, such photographs even appear to emit their own light, to emanate rather than record their images. Placed thus within the inverted commas of candid self-reflection, photography is freed from its traditional subservient role as a realist mode of representation and allowed instead to become a searing index of its own operations, to become an art of the real.

This freedom has sometimes come at a cost. Histories of photography have traditionally favoured camera-made pictures, almost always beginning with accounts of the camera obscura and with efforts to capture automatically the images seen in it. Cameraless photographs are treated as second-class citizens in such histories, with Nicéphore Niépce’s view from his studio window regularly touted as the earliest extant photograph, despite the fact that there exist earlier photographic contact prints made by this same inventor. In 1989, John Szarkowski stated this prejudice as a matter of fact: “the camera is central to our understanding of photography... cameraless pictures... are of interest primarily as exercises that anticipate or further explore discrete and partial aspects of photography’s potentials. Outside the context of photography’s fundamental agenda they would be less interesting than they are.” Szarkowski pushes cameraless photography to the margins, overlooking, perhaps, that the margin of every photograph is in fact already a photogram, a white border created by the shadow of the blade of an easel during the printing process. Be that as it may, relatively few cameraless photographs are included in overviews of photography’s story, and a comprehensive history of the cameraless photograph has yet to be published.

Given its official status as a mere supplement to photography’s “fundamental agenda,” it is striking just how many ambitious photographers have chosen to make cameraless pictures. Could it be that putting the camera aside has allowed them to experiment in creative ways with their medium that would not otherwise be possible? Can one in fact impart ideas or experiences in these kinds of photograph that can’t be expressed in other ways? These questions seem worth pursuing. So do the origins of the photographs themselves. Some of them, for example, have been generated by lightning or radioactivity, by the warm touch of plants or the electrical field surrounding human fingertips, by the growth of bacteria or the energy emitted by a cathode ray tube. Some faithfully trace the dirt and insects found squashed on a car windshield or the marks accidentally left on a blank piece of paper by a Xerox machine. Some document the imprint of botanical
specimens or all the clothing from a single home. Others appear as chemical traces or deformations derived from photographic paper itself. In other words, cameraless photographic work is as varied in process, appearance, and meanings as any other body of photographs, and is just as deserving of our scrutiny.

Much of this work has involved a unique, volatile, and often unpredictable relationship of light and chemistry, without recourse to the familiar conventions a camera imposes on an image. No doubt this maverick potential is what has attracted the attention of so many artists over the years, including a number not otherwise committed to the practice of photography. But, as we’ve already seen, the basic attributes of the cameraless photograph are as evident in ordinary, vernacular examples as in those produced by artists. And there have been literally countless cameraless photographs made over the past 200 years. After all, during the age of analog technology, contact prints were the first photographs anyone ever made, shortly after being introduced to the mysteries of photographic chemistry. Pretty much everyone who ever printed a photograph has made a cameraless one. In every sense, then, this is photography in its most primal state.

The Pioneers

Indeed, history tells us that photography is by no means dependent on the camera, for cameraless photographs were among the first to be produced and have often been made in conjunction with camera pictures. Some scholars have suggested, for example, that the German natural philosopher Johann Heinrich Schulze deserves to be included in the history of photography as the person who discovered, in 1727, the sensitivity to light of silver salts. Independent of any camera, he demonstrated this capacity by pasting paper stencils of words and sentences on a glass bottle containing a chalk and nitrous lime mixture and then exposing them to light. According to this account, then, the first photographic images were ephemeral traces of language, momentary inscriptions of culture in nature. Later that century, the earliest sustained experiments with a photographic process, by Elizabeth Fulhame and Thomas Wedgwood in England, involved the making of images directly on photosensitive cloth, leather, or paper. Fulhame published her View to a New Art of Dying and Painting in 1794, recalling that some fifteen years before, she had experimented with making patterns on cloth by utilizing the light sensitivity of various metals. She now proposed making maps of rivers formed from silver made dark by the action of light. Her ideas were republished and cited in various magazines over the following decades and were specifically referred to in John Herschel’s first paper on photography, delivered on March 14, 1839. However, these ideas seem to have inspired few followers.

Wedgwood’s experiments were more substantial and, thanks to their publication by Humphry Davy in the Journals of the Royal Institution in June 1802, have left a residual trace on the historical record. Titled “An Account of a Method of Copying Paintings Upon Glass, and of Making Profiles, by the Agency of Light Upon Nitrate of Silver,” the article, jointly authored, notes various experiments the two men had undertaken with white paper or leather moistened with a solution of silver nitrate and exposed to light. Despite their inability to make their images permanent, in the space of five short pages they describe an impressive range of photographic ideas and applications. Wedgwood apparently began by attempting to capture the image formed by the camera obscura and only subsequently moved on to the problem of copying pre-existing images. Of these, the two experimenters tried to copy paintings on glass (such as those used for projection devices) and “profiles of figures” (perhaps a reference to silhouette portraits). They also made contact prints using leaves and insect wings as well as engraved prints. Unable to prevent their light-sensitive solutions from continuing to develop and go black, none of these photographs survived for long. However, the essay was frequently reprinted and its findings would have been familiar to anyone expert in chemistry in the early nineteenth century.

The photographic experiments of a pair of French brothers, Claude and Nicéphore Niépce, were more successful. These experiments—beginning with paper soaked with chloride of silver and moving on to glass and metal plates coated with a light-sensitive solution of bitumen of Judea—were initiated in 1816 by the prospect of a grant offered by the French government to improve the reproductive capacities of lithography. In keeping with this inducement, the earliest photographs made by the Niépce brothers were light-generated copies of engravings. In 1822, for example, Nicéphore reported being able to make an inverted copy of an oiled engraving of Pope Pius VII placed directly on a glass plate coated in bitumen and exposed to sunlight. Similarly prepared and exposed pewter plates were subsequently etched with acid to increase the depth of the impression, allowing ink on paper positive prints to be pulled from this photographically inscribed metal matrix. One print that has survived, Cheval avec son conducteur (A Horse Being Led), dating from about July 1825, features a copy of a seventeenth-century Dutch
engraving by Dirck Stoop (PL. 1). Although Niépce also made experiments with images formed in a camera, the copying of existing pictures remained central to his work. In September 1827, for example, Nicéphore visited London to see his sick brother, taking along several examples of his heliography (as he called it). According to Robert Hunt, writing in 1844, Niépce ended up leaving behind at least seven photo-engraved metal plates, made using three different processes, as well as two paper impressions printed in 1827 from yet another plate (a heliographic copy of a seventeenth-century engraving, Portrait of Cardinal d'Amboise, PL. 2)." Six of those plates were engraved with copies of existing prints; that is, with cameraless representations of what were already representations.

Once again, however, the existence in London of these pioneering photographs was soon forgotten. It was only in October 1833 that the renowned English gentleman scholar William Henry Fox Talbot, attempting to make drawings with a camera lucida instrument while on his honeymoon in Italy, conceived of some experiments that might allow "natural images to imprint themselves durably, and remain fixed upon the paper." On his return to England in 1834, Talbot drew on his knowledge of chemistry to brush sheets of writing paper with common salt and then with a solution of silver nitrate, resulting in a substrate infused with particles of light-sensitive silver chloride. The first images he made using this photogenic drawing paper, as he later called it, were contact prints of pieces of lace (FIG. 2) or botanical specimens placed directly on the paper under a sheet of glass and then exposed to the sun (PL. 4). A touchable object, like a scientific specimen, the photograph was in the piece of paper but it also was the piece of paper. One example is but a liquid smear of blue fibres, the geometric pattern of the lace once imprinted in them now barely discernible (PL. 3). As a primitive form of printing-out paper, photogenic drawing images became visible as Talbot watched. He could then stop their further development with the addition of another solution of salt. By this means, a shadowlike, reverse-toned photographic picture—what we would now call a negative—could be produced and shared with others.

Later that year, in August 1834, Talbot returned to Europe and continued his experiments during a stay in Geneva. This time, he had a friend make some drawings on sheets of varnished glass exposed to smoke, using an engraver’s needle to scratch through this darkened surface. The procedure came to be known as cliché verre. As Talbot later recalled, “when this is placed over a sheet of prepared [photogenic drawing] paper, a very perfect copy is obtained, every line which the needle has traced being represented by a dark line upon the paper” (PL. 25). One of these drawings was a view of Geneva, as seen through Talbot’s own window, but he also proposed to make photographic copies of handwriting in a similar fashion. Both the wonder and the limits of his achievement are well expressed in a letter he received from his sister-in-law, Laura Mundy, in December 1834. She thanks him for sending her “such beautiful shadows, the little drawing I think quite lovely, that & the verses particularly excite my admiration. I had no idea the art could be carried to such perfection. I had grieved over the gradual disappearance of those you gave me in the summer & am delighted to have these to supply their place in my book.” It appeared that Talbot’s fixing chemical—common salt—delayed but did not yet stop the development process entirely.

Unable to solve this problem and frustrated by the relatively small and indistinct images he had been able to make in a camera obscura, in 1835 Talbot more or less put his photographic experiments aside. Until, that is, his attention was drawn to the announcement in early January 1839 that a former business partner of Niépce, a French painter and designer by the name of Louis-Jacques-Mandé Daquierre, had invented his own photographic process. Named “daguerreotype” after himself, the process involved a complicated series of techniques that resulted in a copper plate coated in a fragile but photosensitive amalgam of mercury and silver iodide. When placed in the back of a camera and exposed to light, these plates were gradually transformed into sharp and detailed monochrome pictures of whatever unmoving object the camera was pointed at. With this news as a prompt, Talbot hastily arranged an exhibition of his photogenic drawings at the Royal Institution in London on January 25, 1839. Among them he included “pictures of flowers and leaves; a pattern of lace; figures taken from painted glass; a view of Venice copied from an engraving,” as well as images
made using a solar microscope or a camera obscura. By August, he was able to send a larger sample of photogenic drawings to a meeting of the British Association in Birmingham that included sixty-four cameraless pictures and twenty-one made with a camera obscura.

The announcement of Talbot’s invention induced a number of others to come forward with accounts of earlier, if less resolved, experiments toward the same end. For example, a Frenchman living in Brazil named Hercules Florence claimed to have also pursued a photographic process, having made contact stencil prints as early as 1829, before going on, in 1833, to make some pictures with a camera obscura. No doubt he was one of many such pre-1839 experimenters, even if only a few put their names forward for posterity. Indeed, a story published in Chambers’ Edinburgh Journal on October 19, 1839, is a reminder that cameraless photographic images may well have been made for some time before photography was so named.

We have ourselves a somewhat remarkable fact respecting photography to communicate to the public. Since the subject came into notice in Britain, a young Scotch barrister of our acquaintance has brought to us a number of specimens of the art, executed by himself and his young companions, fifteen years ago, when they were attending the grammar-school of Aberdeen. Photography, which has since become the subject of so much interest and so much discussion among grave men, was then and there practiced merely as one of the ordinary amusements of the boys, a sheet of paper covered with nitrate of silver, and then held up to a sun-lit window with a leaf or feather or picture before it, being the whole mystery of the process. Our young friend has no recollection of its being considered as any thing either new or wonderful: it simply ranked amongst the other amusements which boys in a great school hand down from one to another. The specimens resemble those which have been exhibited during the last few months before our scientific societies …

The making of a photographic contact print, the originary gesture for all photography, has its own origins repeated to infinity, with no definitive beginning (and, as yet, no end either). The notion was reinforced by the earliest reproductions of photographic images. Wood-engraved “fac-similes” of photogenic drawings made using Talbot’s process were published in English journals as early as April 1839. In that month, The Mirror of Literature, Amusement, and Instruction published an engraved version of a photogenic drawing contact print of three sprigs of ferns on its cover, printed in rust tones to imitate the look of the original photograph. According to the following issue, “the engraving gave a most accurate idea of the photogenic picture, which represents the fern with such extreme fidelity that not only its veins, but the imperfects, and accidental folding of the leaves of the specimen are copied,—the greater opacity of the folded parts being represented by the large white patches on our fac-simile.” On April 27, The Magazine of Science also devoted one of its covers to wood-engraved “Fac-similes of Photogenic Drawings,” two of botanical specimens and one of a contact print of a piece of lace (FIG. 3). This last image, in its machine-made repetitions of geometric patterns, was the very embodiment of mass-production techniques, and thus of industrial capitalism. The plant specimens conjured nature, photography’s generative force, but also the science of botany and its particular representational demands. This, then, is how most people in Britain first encountered a photographic image. For them, the original photograph was an image at once cultural and natural, but also an image made without a camera.

A botanist of international repute himself, Talbot continued to make contact prints of plants, with his photography rendering them, as he wrote in 1839, “with the utmost truth and fidelity, exhibiting even the venation of the leaves, the minute hairs that clothes the plant, etc.” As he pointed out, these prints also demonstrate photography’s capacity to save time and effort, “for the object which would take the most skilful artist days or week of labour to trace or to copy, is effected by the boundless powers of natural chemistry in the space of a few seconds.” By allied his invention with the automation of handicrafts, Talbot declares his contact prints to be a pictorial manifestation of an industrial process. It is well to keep this in mind when viewing his earliest examples; even the most seemingly innocent of Talbot’s images is animated by this larger context and its tumultuous consequences.

Many of his contact prints of plants simply involve placing a specimen onto the middle of a piece of photogenic drawing paper and exposing both to light, as if to rep-

FIG. 3. Cover of The Magazine of Science, London, April 27, 1839: “Fac-similes of Photogenic Drawings.” 15.5 × 11.5 cm (6 1/8 × 4 1/2 in.). Turnbull Library, Wellington
licate the symmetrical exactitude of pre-photographic botanical illustrations (PL. 5). Others have been composed with their stems protruding from one edge of the picture, as though they have been photographed from side on, with a camera. But some, like a rendition of a cascade of spruce needles, offer a new kind of image altogether. The photograph makes it look as though the needles are tumbling through space in front of a camera, falling from top to bottom of the picture plane, apparently caught in an instant of light-sensitive exposure. But we have to remember that this is a contact print, produced when Talbot scattered some needles across his horizontal sheet of prepared paper, so that they lay there statically in the sun long enough to leave an impression (PL. 6). Having given the play of chance full rein, he then fixed whatever image happened to result, thereby reproducing photographically the unpredictable operations of nature’s own mode of reproduction. Despite the slowness of his exposure times, Talbot here found a way to represent contingency, eventually to be regarded as an essential characteristic of his medium. But a picture of this kind also collapses any distinction between figure and ground (as well as between up and down), and its edge becomes an arbitrary cut within a field of potentially infinite elements rather than a rational frame surrounding a discrete object. It’s a picture, in other words, that decisively breaks with all received conventions of picture making.

At one point, Talbot imagined that his invention would “enable poor authors to make facsimiles of their works in their own handwriting.” As if to provide a model of this procedure, in about April 1840 Talbot borrowed a page of a manuscript written by Lord Byron from his neighbor, Byron’s biographer Thomas Moore. He then made at least three photogenic drawing contact prints of this page, the last stanza of Byron’s 1814 poem Ode to Napoleon Buonaparte (PL. 7). Talbot even made positive prints from two of these negatives, proving that photography could indeed be capable of reproducing old texts in exact multiple copies. The final grandiloquent flourish on this particular page reinforces the idea that this is an exact and automatic replica of a trace of the actual author’s hand. But photographic contact prints in fact confused precisely this kind of authorial certainty, at least for themselves. As Talbot described the operations of photography, “by means of this contrivance, it is not the artist who makes the picture, but the picture which makes ITSELF.” Here was a complication that many later photographers would seek to exploit.

Lace was another of Talbot’s earliest and most frequent photographic subjects. As we’ve heard, this was a significant choice at a time when the British textile industry was being transformed by industrialization. But it also allowed him to demonstrate the exact, indexical copying of intricate details that photography could provide. On January 23, 1839—before he had even publicly announced his invention—he sent a photogenic drawing of a piece of lace to Sir William Jackson Hooker to show to manufacturers in Glasgow. Hooker wrote back on March 20, 1839, to report that “your specimen of Photogenic drawing...has interested the Glasgow people very much, especially the Muslin Manufacturers—and also excited great attention at a Scientific Meeting.” In a paper delivered on January 31, 1839, Talbot tells the story of showing just such a photograph of lace to a group of friends and asking them whether it was a “good representation.” They replied that they were not so easily fooled, for it “was evidently no picture, but the piece of lace itself.” This gratifying story demonstrated that contact printing was able to present the lace as a persuasive pictorial illusion of white lines on coloured paper. His photograph of lace looked like the real thing.

When Talbot included one of these lace negatives in the December 1845 fascicle of The Pencil of Nature, a book of his photographs, his accompanying text carefully explained the difference between a contact print ("directly taken from the lace itself") and the positive copies that could be taken from this first print (in which case, he says, “the lace would be represented black upon a white ground”) (PL. 8). He acknowledges, in other words, the exact reversal of tones that is such a distinctive aspect of the contact print. Almost always a negative inversion of whatever it represents, a cameraless photograph can’t help but be an exercise in othering. Unperturbed, Talbot goes on to suggest that a negative image of lace is perfectly acceptable, “black lace being as familiar to the eye as white lace, and the object being only to exhibit the pattern with accuracy.” So Talbot recognises from the outset that photography provides an indexical truth-to-presence, even if not necessarily a truth-to-appearance. A photograph, he reminds us, tells us that something was there, but not exactly what it looked like. Here, then, was a visual reiteration of yet another key idea about the nature of the photographic medium.

The announcement of Talbot’s discoveries encouraged many others, in Britain and elsewhere, to experiment with the making of cameraless photographic pictures. A photogenic drawing of a feather made in 1839 by Michael Faraday, the man who actually announced Talbot’s invention, has survived (FIG. 4). So has a contact print of some leaves of grass made on March 21, 1839, by
Nicolaa Henneman, Talbot’s valet and photographic assistant. Indeed, as Talbot busily sent examples to friends and family members throughout 1839, as well as to colleagues overseas, we can imagine repeated versions of the scene described by his cousin Charlotte Louisa Traherne, writing to Talbot on February 28, 1839: “I was charmed with the piece of lace you sent, it is much too pretty to have it again, John Llewelyn has been making some paper according to your process and they are all busy trying little scraps of lace and ribbon one succeeded very well this morning before breakfast but the day is clouding over.”

Those particular experiments are lost, but we can still point to a picture of a shark egg case, one of six photogenic drawing contact prints probably made in the summer of 1839 by Sarah Anne Bright (PL. 10), and another made by Talbot’s Welsh colleague Nevil Story-Maskelyne of a lace cuff (PL. 9), as well as some leaves apparently recorded by Sebastiano Tassinari in Italy (PL. 11) and a specimen of Circaea lutetiana imprinted photogenically by M. Carey Lea in the United States (PL. 12). On April 6, 1839, John Herschel even brushed some silver chloride onto the bottom of a letter he sent to a botanist friend living in South Africa, thus allowing him to add an actual photograph to his description of the process (PL. 13). Others had the same idea: on April 15, another Englishman, the artist George Tytler, sent a similarly imbibed letter to a Scottish friend, passing on several images he made directly on the same piece of paper.

Herschel’s scientific notebooks are full of his photographic experiments, with one from February 1839 stratified with divided vertical columns filled in with chemical solutions, evidence of his sustained interest in the effects of different coloured light on a range of light-sensitive substances, including those derived from vegetables. A later example consists of four horizontal stripes of light-sensitive solutions, again deployed to test their relative reactions to different colours. The bottom stripe, with its liquid intimations of blue and violet, is comprised of an iron compound (PL. 14). In a paper delivered to the Royal Society on June 13, 1842, Herschel proposed a photographic process involving a similar iron salt that resulted in Prussian blue images; he decided to call this “cyanotype.”

Exploiting this invention, Talbot’s colleague Anna Atkins issued albums of cyanotype prints of seaweed and algae from 1843, and these are often regarded as the earliest photographic books. Using William Harvey’s unillustrated Manual of British Algae of 1841 as her guide, Atkins tells us in her introduction to Part 1 of British Algae: Cyanotype Impressions that she was attempting a “systematic arrangement,” trying to photographically represent “the Tribes and Species in their proper order.” Atkins carefully composed each image, resulting in a symmetrical print in which the piece of seaweed floats in an appropriately blue sea of cyan (PL. 19). This symmetry enhances her scientific ambitions with the aesthetic of reasoned placement. Where necessary, specimens were folded over onto themselves so that the whole plant could be pictured on a single sheet. Even Atkins’ accompanying text is a cyanotype contact print. Lacking any hint of periodicity, these cyanotypes look as if they were made yesterday, offering a trace from the past that nevertheless always remains contemporary.

In the 1850s, Atkins collaborated with Anne Dixon to produce at least three presentation albums of cyanotype contact prints, including Cyanotypes of British and Foreign Ferns (1853) and Cyanotypes of British and Foreign Flowering Plants and Ferns (1854) (FIG. 5). British and Foreign Ferns included examples from places like Jamaica and Australia, allowing for a global, or at least an imperial, perspective. The later albums also exhibit a more creative arrangement of their plant forms, signaled by their cover designs, along with individual plates featuring loose decorative displays of peacock, emu, parrot, duck, and partridge feathers and of pieces of lace (PL. 20).

Early French photographers also explored the creative potential of cameraless photography. One of Daguerre’s rivals, Hippolyte Bayard, had invented his own direct positive paper-based photographic process in early 1839. The first page of an album devoted to his photographic experiments consists of two segmented sequences of coloured rectangles, a kind of test pattern of light-sensitive chemistry (PL. 15). Although not recording anything other than their own sensitivity to light, and thus failing to prove the efficacy of his process as a way of automatically making pictures, Bayard nevertheless

kept and mounted these experiments. To him, they were all simply photographs. On his third page, we are shown more complex examples, including some that are almost painterly in their curvilinear swathes of hues. These rectangular fields of colour are followed on subsequent pages by contact prints of pieces of lace, botanical specimens, and engravings, along with camera-made photographs of plaster statuettes and even of Bayard himself. The album therefore obeys a logical narrative, opening with photography's self-portraits before proceeding to those of the photographer.

Bayard also experimented with the cyanotype process. One example from an album dated about 1842 has its unusually diverse array of components—leaves, flowers, three feathers, some lace, and a square of woven cloth—scattered haphazardly across the entire picture plane, ignoring both symmetry and the implied order of taxonomy in the interests of an overall patterned effect (PL. 16). Art, rather than science, seems to be the guiding logic. Like Talbot's renditions of spruce needles, this kind of composition abandons the perspectival focus provided by both the camera and a centralised referent. Instead, it actively decentres the observer, asking us to cast our eyes back and forth over the photograph by offering no singular resting point, and thus no visual confirmation of a stable position in space and time. It offers, in other words, a strikingly modern viewing experience.

Given the fragility of its surface, the daguerreotype process did not lend itself to contact printing. But this doesn't mean that none were made. Talbot himself talks about having made a contact print of lace on a silvered plate as early as September 1839: "very pretty, & is different in effect than Daguerre's." In a later letter to Herschel, dated July 1, 1841, he went on to issue an imaginary challenge to the French-born London-based photographer Antoine Claudet regarding Talbot's latest invention, the calotype process: "it is a nice point to determine which is the most sensitive to light, my Calotype paper, or the Daguerreotype improved by Claudet's process. I am sensitive to simple moonlight; he has not yet made the trial, which I throw out as a challenge to all photographers of the present day: viz. that I grow dark in moonlight before they do."

Whether or not he ever heard this challenge direct from the calotype's inventor, five years later, in March 1846, Claudet sought to meet it. Note that Claudet repeats a type of photograph—a contact print of a piece of lace—that was among the first and most frequent of Talbot's own photographs.

SCIENTIFIC DISCOVERIES. The London correspondent of the Boston Atlas, describing a scientific soirée, says: What seems to cause the greatest astonishment, is an impression of black lace upon a daguerreotype plate, by the light of the stars! M. Claudet, in referring to this phenomenon, observed, that he considered it as proof of the chemical power of star-light. He said that he had prepared a plate in the usual manner, covered it with a piece of black lace, and exposed it to the then brightest part of the sky, the constellation Ursa Major, nearly at the zenith. It was left to the influence of these, and the surrounding stars, for about fifteen minutes, which sufficed to impress the black lace upon the plate.

Unfortunately, Claudet's star-powered daguerreotype of lace has not survived to the present. However, other daguerreotypists did find ways to make striking images without the use of a camera. The pioneering American photographer John William Draper, for example, produced a number of impressions of the solar spectrum as cast by a glass prism onto daguerreotype plates, using a convex lens to focus each of the coloured rays in succession. On September 26, 1842, he sent a version he had made in Virginia to Herschel, annotated both on the plate and in its margins (PL. 17). Consisting of nothing but a thin vertical line, only the addition of this coded text—soon followed by competing interpretive essays by each man in the Philosophical Magazine—converted this image from abstraction into science. In similar fashion, in 1844 the French physicist Léon Foucault collaborated with physician Armand Hippolyte Fizeau to try and photograph light itself. To that end, they carefully exposed a silvered daguerreotype plate to three different kinds of light for different periods of time in an effort to measure their respective intensities. These exposures were recorded as a series of vertical stripes (PL. 18). The daguerreotype, initially celebrated for its unprecedented ability to capture minute details, is here reduced to a
graph, to a picture of nothing—of nothing, that is, but its own capacity to represent anything.

Most professional daguerreotype studios focused their efforts on the lucrative business of making portraits or landscape views. Nevertheless, contact prints of botanical specimens continued to be made throughout the nineteenth century, especially by amateur photographers interested in exploring the patterns left on their photographic papers by various flowers and leaves. This gave such prints a distinctive class allegiance; the daguerreotype was associated with those in trade, whereas paper photographs tended to be made by those with leisure and independent means.

Thus do we find the maker of the so-called Hatton Fern Album in about 1850 juxtaposing a fern (a sample of _Paris arguta_) with this same specimen’s cyanotype impression. An English album maker named Blanche Shelley made a similarly delicate contact print using Talbot’s photogenic drawing process and a daffodil and ferns as late as 1854 (FIG. 6). In about the same year, another Englishwoman, Cecilia Glaisher, proposed the publication of an album of salted paper impressions to be titled _The British Ferns Represented in a Series of Photographs_. By then, new processes involving collodion on glass negatives and salted paper albumen prints had been introduced. In 1875, for example, the French photographer P. E. Delarche produced an albumen photograph of a flowering specimen. Having carefully centred the specimen on his paper, he hand coloured the resulting image, restoring to it the illusion of life (PL. 21). This effort betrays a long-standing desire to move beyond monochromatic photography and record the world in full colour. In 1869, another Frenchman, Louis Ducos du Hauron, displayed a diversely coloured contact print of leaves and flowers to prove that he could indeed achieve such a result (PL. 22).

Using a sequence of green, orange, and violet filters, Ducos du Hauron printed on thin sheets of bichromated gelatin containing carbon pigments of red, blue, and yellow, thus allowing the production of “naturally” coloured photographic images. In the same year as he made his cameraless example, Ducos du Hauron described his results in _Les couleurs en photographie: Solution du problème (Colours in Photography: Solution to the Problem)_. Although a commercially viable solution was in fact still some way off, its possibility could no longer be denied.

Other cameraless photographs from the 1840s and ’50s were of a more conceptual kind. Having conceived of a new and quicker photographic formula better able to compete with the daguerreotype, Talbot had patented his calotype, or, as his mother preferred, his Talbotype process in 1841. On December 11, 1848, one of his associates, Thomas Malone, exposed a piece of sensitised calotype paper to the intense light of some burning phosphorous as part of a lecture, “On the Chymical Action of Light on Paper,” he was conducting at the Western Literary & Scientific Institution in London (PL. 23). The sign of success was the appearance in the middle of the picture plane of the word “talbotype,” outlined by a stencil that had been laid upon the paper. In about 1858, Talbot produced a similarly reflexive contact print of a French label for hypo-sulfité of soda, highlighting the name of the substance that fixed or destroyed photographic images, depending on its degree of concentration. Talbot’s print circulated as a photoglyphic engraving, a photomechanical process invented by him to supersede the uncertainties of calotype production by printing photographs in permanent ink on paper. One medium is recorded in another as a way of declaring that the first is now obsolescent, a palimpsest that allows both to be visible simultaneously.

An earlier version of this engraving process involved the coating of a steel plate with a potassium bichromate-sensitised gelatin emulsion, which hardened when exposed to light. Once again Talbot described it in terms of an ability to make accurate photographic imprints without a camera: “The objects most easily and successfully engraved are those which can be placed in contact with the metallic plate,—such as the leaf of fern, the light feathery flowers of a grass, a piece of lace, etc. In such cases the engraving is precisely like the object; so that it would almost seem to any one, before the process was explained to him, as if the shadow of the object had itself corroded the metal,—so true is the engraving to the object.” After the plate had been etched, multiple photographic images of these objects could be reproduced in ink on paper. To demonstrate this process, which he called photographic engraving, Talbot printed two or more sheets of gauze layered over each other at oblique angles, resulting in varying densities of tonality (PL. 24). The result is a half-tone image of a half-tone image, as if we were looking into a pair of confronting mirrors, “each seeing the other in itself, and itself in the other.”

Although probably unaware of Talbot’s earlier experiments with the _cliché verre_ technique, a group of artists associated with the Barbizon movement in...
France adopted this same practice in the 1850s, including Charles Daubigny, Jean-François Millet, and Jean-Baptiste-Camille Corot. An image was sketched with a sharp instrument by scratching through a dried collodion layer applied to a sheet of glass. In the case of Corot, a salted paper photograph was then contact printed from this glass sheet by one of his friends, either Eugène Cuvelier or Léandre Grandguillaume. The resulting photographs demonstrate the fluid, intimate gestures and rapid hatching Corot adopted for this process and the consistently even tones that photographic printing made possible, along with this artist’s interest in capturing nostalgic, almost elegiac, scenes of a vanishing rural lifestyle or of classical themes set in a landscape (PL. 26). But it also shows Corot’s interest in exploring new ways of making multiple editions of his work, for he produced over sixty-five individual cliché verre images during his career.

It is often forgotten that architectural blueprints, being contact prints on cyanotype paper from a translucent drawing, are also a form of cliché verre photograph. They first became commercially popular as a way of printing cheap maps for the Klondike gold rush of the 1890s. The ability to reproduce topographical drawings quickly and in large numbers had an obvious military utility and thousands were produced during the First World War, allowing the shifting boundaries and dangers of No Man’s Land to be identified on a frequent basis (PL. 27). Only in the 1940s did blueprints come to be replaced by diazo (ammonia) prints, which generated drawings with blue/violet lines against a whitish background. Interestingly, a number of Australian artists, some working in Melbourne and some in London, issued prints in the 1940s and early ’50s using blueprint paper, perhaps because, during the deprivations that attended the aftermath of the Second World War, it was a cheap and available material. James Cant, for example, an artist interested in both Surrealism and Australian Aboriginal art, brought the two together in his designs for a portfolio titled Six Signed Artist’s Prints that he issued in a print run of 150 in 1948 (PL. 28).53

Photographers quickly discovered one advantage that contact printing had over camera-made pictures: the relative ease with which combinations of images could be made. As early as February 26, 1839, Herschel was able to superimpose a character over a leaf, fixing the result with hyposulfite of soda, his widely adopted solution to the problem of stopping photographs from continuing to develop (PL. 29). He thus initiated a practice of assemblage that has been a strong presence in photographic work ever since. Similar combination prints were made, for example, by the German experimenter Johann Carl Enslen, who, at the age of eighty, illustrated his commitment to both nationalism and the study of nature by surrounding an engraved portrait of Frederick the Great with impressions of butterflies, feathers, and botanical specimens.54 In September 1840, Talbot took receipt of a gift of three of Enslen’s photogenic drawing montages, including one that superimposed a leaf over a photograph of an engraved head of Christ, a neat visual encapsulation of natural philosophy as a theological project (PL. 30). In such montages, two images, each representing distinct moments in time and space, are brought together as a single photographic surface, thus providing the experience of an otherwise impossible simultaneity of terms. Photography, so commonly associated with a faithful realism, is, from its very first year, shown to also be capable of a strange kind of constructedness, even of pointed commentary. These are photographs, then, that don’t so much affirm a belief in the truthfulness of photographs as invite us to suspend it.

Sometimes these montages were made with an explicitly political purpose in mind. In about 1853, while he was in exile on the island of Jersey, off the coast of Normandy, Victor Hugo collaborated with his son Charles to produce photographs that could be sent back to republican supporters in France.55 One of them, a salt print from a collodion negative, shows Victor with his elbow on some rocks, gazing wistfully toward home. At some point, this negative was artfully embellished with an added framing of contact-printed leaves, along with the ex-lie’s name and location in capital letters, and then printed again (PL. 31). This strategic combination brings flatness and depth together in the same picture plane, drawing our eye deep into the scene, to the soulful figure of Hugo, and then back to the surface of the print and its shadowy assemblage of leaves. It turns the photograph into a self-conscious thing in the present rather than allowing it to remain simply a window onto the past.

A similar technique must have been used in about 1854 to make a portrait of the Welsh scientist Thereza Dillwyn Llewelyn looking through her microscope. In 1853, she herself had put together an album of twelve of her photogenic drawing contact prints of marine algae, gathered at Caswell.56 In her portrait, seemingly made by her father, Llewelyn is encircled by a wreath of contact-printed ferns, perhaps intended as an ocular metaphor that aptly reiterates her own act of enhanced seeing (FIG. 7).57 The combination of camera-made and camera-less images is repeated in a portrait of Kate Dore produced by Oscar Rejlander and Julia Margaret Cameron (PL. 32). There is at least one other contact print of
botanical specimens made by Cameron from around 1862. Could it be that the direct fragments of nature in the combination print were Cameron’s contribution to this photographic expression of an ideal femininity, undertaken while she was still learning the art for which she is now so renowned?

Anna Atkins had proved the efficacy of the cyanotype process as a way of making accurate contact prints that could be bound into book form. A number of similar efforts appeared later in the nineteenth century. Charles F. Himes, an American, published his Untitled (“Leaf Print or Glimpses at Photography”) in 1868, including an albumen contact print of such a leaf as his frontispiece. Herschel’s daughter Julia employed his invention to illustrate A Handbook for Greek and Roman Lace Making, which she self-published in 1869 with twenty-two cyanotype contact prints of both pieces of lace and hand-drawn ink copies of the same (PL. 33). Herbert Dobie, a railway station master and amateur botanist who emigrated to New Zealand from England in 1875, made cyanotype contact prints of specimens of all 148 known species of fern in his new country in 1880 and sold them in album form (PL. 34). Dobie was responding to a local fashion for collecting and displaying ferns, a fashion driven in part by nostalgia for a premodern style of life and in part by incipient nationalism (“Fernland” being an early colloquial name for New Zealand: the first Māori rugby team toured Britain in the same decade with a silhouetted fern emblazoned on their jerseys). The end result is a group of images that hover somewhere between science and art, between popular aesthetic enjoyment and commercial profit.

The Wonders of Science
Camereless photography remained a relatively minor practice during the later nineteenth century, with one notable exception: the field of science. On December 22, 1895, medicine—in the figure of German-Dutch physicist Wilhelm Röntgen—found a way to allow photography to go beneath the opacity of the skin and reveal hitherto unknown corporeal landscapes. Working in an enclosed room with a cathode-ray tube, Röntgen noticed that a shadow-

version of the bones of his hand became visible against a fluorescent panel when he held that hand in front of the tube’s light source. He thus discovered so-called x-rays and the opacity of bone to these same rays. He immediately set about turning this phenomenon into a photographic image, first taking a radiograph of his door (showing only the metal handle and traces of lead-based paint). He then made a contact print of his wife Bertha’s left hand and its wedding ring resting on a photographic plate, using an exposure of about fifteen minutes. She reportedly shuddered at the sight, having, she said, “a vague premonition of death” (PL. 35). Interestingly, in the craze for taking x-ray pictures that followed, a woman’s hand, with ring, was a popular choice of subject; a technology that allowed all sexual identity to be dissolved nevertheless had it insistently reasserted through the inclusion of this wearable sign of the feminine.

Science had now demonstrated that a completely invisible emanation could manifest its presence on a photographic plate. Within a year of Röntgen’s discovery, more than a thousand articles and almost fifty books had been published about it, and x-ray imagery had become a global phenomenon. Some photographers sought to emphasise the aesthetic potential of the new medium. In 1896, for example, a duo of Austrian chemists, Josef Maria Eder and Eduard Valenta, issued fifteen finely printed photogravures under the title Versuche über Photographie mittelst der Röntgen’schen Strahlen (Experiments on Photography by Means of Röntgen’s Rays), with each plate a carefully arranged disposition of a given specimen, from a human hand to a pair of frogs to a beautifully articulated snake skeleton (PL. 36). The title of a particularly interesting plate can be translated as Table of the Permeability of Various Substances to Röntgen Rays, and consists of an x-rayed array of designated items, from a piece of zinc to a sample of flint glass. The abstraction of this composition is repeated in an album of albumen contact prints of x-rays issued by the Portuguese photographer Augusto Bobone, also in 1896. Appearing, inevitably, beside an image of a woman’s left hand decorated with rings, plate 44 of Bobone’s album compares the x-ray shadows left by a key with those of various other, nonmedical items, just to see...
how they all might look when photographed in this way.\(^{62}\)

Röntgen was not the only scientist pushing photography to new limits. French physicist Henri Becquerel had, like Draper, managed to record aspects of the solar spectrum on a daguerreotype plate in 1848. Almost fifty years later, on February 27, 1896, Becquerel was conducting experiments on the phenomenon of fluorescence, seeking to expand on the discovery of x-rays. By chance he wrapped his fluorescing crystals—a uranium compound—in a black cloth bag, along with a copper Maltese cross and a photographic plate. When he looked again several days later, he was surprised to find a faint impression of the cross on the plate, apparently caused by some otherwise invisible radiation emitted by the uranium. After several more deliberate experiments, using slitted screens made from aluminium, he concluded that the uranium salt was indeed the cause of the photographic images he was creating, a property that Marie and Pierre Curie came to call “radioactivity.” The photographic proofs of this property were images that looked like an emblematic rising sun, the source of all life (PL. 37). This discovery led to others, resulting in the production of x-ray diffraction photographs of crystal lattices by Max von Laue and his team in 1912 and of the double helix structure of DNA crystals by Rosalind Franklin and R. G. Gosling in 1952. Like x-rays, the patterns recorded in these scientific photographs, patterns that seemed to be traces of nature’s own eminently abstract tendencies, had a huge impact on the popular imagination.

But these sorts of discoveries also transformed understandings of the photograph. Thanks to science, photography was now as much about the invisible as the visible, apparently able to reveal the inner life of whatever or whoever it pictured. It was a small step to speculation about the existence of electrical fluids and invisible vital forces (Röntgen himself had referred to an electric ether as the agent of his x-ray pictures). The Swedish playwright August Strindberg, for example, decided that he wanted to “imitate … nature’s way of creating,” and for him this meant harnessing chance operations in the pursuit of artistic creation.\(^{63}\) Among other efforts, he placed saline solutions directly onto his photographic plates and exposed them to heat and cold, recording the resulting crystallization (which he suspected might be capable of being read like an ancient script) in paper contact prints. In 1893–94, while in Dornbach, Austria, he placed some glass photographic plates on a windowsill or on the ground and exposed them to the nighttime sky, without any further intervention. Photographs derived from these plates, his “celestographs,” were sent to the French astronomer Camille Flammarion in Paris, helpfully inscribed on the reverse (“Stars. The Orion region”). Dark, almost earth-coloured, and now sometimes further marked by ink or grease stains, these photographs are speckled with dots and other deformations, analogies, if not necessarily direct transcriptions, of a greater world of phenomena (PL. 38). As Strindberg himself wrote, “nothing is more pleasant than having your imagination in motion.”\(^{64}\)

Inspired by Röntgen’s discoveries, other experimenters speculated about the possibility of photographically recording equally phantasmagorical radiations not yet recognised by official science. A retired French soldier named Louis Darget took to strapping unexposed photographic plates to people’s foreheads, claiming the resulting photographs to have captured evidence of “V-rays, human radioactivity,” or, more directly, the visible impressions of dreams or thoughts (FIG. 8).\(^{65}\) Conceived as scientific experiments, these photographs come with Darget’s handwritten inscriptions, describing his method and helpfully interpreting the otherwise abstract imagery his process has produced (“Photograph of Thought: Planet and Satellite”) (PL. 39). As in the concurrently developing science of psychoanalysis, it might be said that the narrative derived from the image revealed more about the desires of the photographer than about the thoughts of the subject who had been photographed. Despite this danger, a number of studies were made of the powers of psychics, using photographs as evidence of their ability to channel similarly mysterious forces. In 1921, the London-based Australian medium Madge Donohoe pressed photographic plates against her face, the result being enigmatic images—apparently a visual code sent from the spirit world—that came to be called “skoto-graphs” (PL. 40).\(^{66}\) F. W. Warrick’s 1939 book *Experiments in Psychics: Practical Studies in Direct Writing, Supernormal Photography and Other Phenomena*, devoted a chapter to...
the skographs he witnessed being made by a Mrs. Ada Deane between 1923 and 1928, reproducing numerous examples of the “freakish results...the origin of which I cannot account for.”

As early as 1861, the Austrian scientist Karl Ludwig Freiherr von Reichenbach had conducted experiments to photographically capture electromagnetic radiations emitted by the human body, which he called the “od.” He arranged to have various substances and objects successively placed on an unexposed collodion plate, including his own hand. The plate had been masked with geometrical shapes cut into a sheet of pasteboard, and the impressions of these that subsequently appeared on the plate were ascribed to these otherwise invisible emissions. The discovery of x-rays encouraged further experiments along these same lines. Henceforth, for some, photographic science became a kind of theology of the visual, a spiritualist or magical art of the body and its secret or hidden emanations. In 1896, for example, the French doctor Hippolyte Baraduc published a book, The Human Soul: Its Movements, Its Lights, and the Iconography of the Fluidic Invisible, in which he suggested the possibility of a “spontaneous iconography” created by the luminous vibration of one’s soul: “The invisible fluid manifests itself by its own intimate, luminous, intrinsic force...In a word, one must know how to induce the psycho-odo-fluid current which the plate records as it passes by.” He made over 200 photographs of this “iconography” to illustrate his thesis, including one extraordinary cyanotype impression of a burst of energy. It is worth noting that, in all these cases, a camera was regarded as an inhibiting or distorting instrument. For these images to have the force of evidence, of reportage, they needed to be direct, unmediated transcriptions of the vital fluids at work.

The question, of course, is what such images are evidence of. As Darget’s work demonstrates, interpretation is a crucial element of the evidentiary status of all scientific photographs. Baraduc’s “electrophotographie” of the vital fluid whose existence he sought to prove looks remarkably similar to an equally stark cyanotype made using an electrostatic generator capable of producing a spark of electricity at high voltage, operated by a now-unknown French experimenter. Many different kinds of machines were designed to generate such sparks. A German-born instrument maker named Heinrich Daniel Ruhmkorff patented his version of an induction coil in Paris in 1851, producing a type of electrical transformer that allowed sparks more than 30 centimeters long to jump across an air gap in the apparatus. Working in Strasbourg, the veteran French photographer Charles David Winter recorded the extraordinary results on a collodion glass plate placed in that gap in about 1865 (PL. 41). Camerless photography was now capable of capturing a picture of nature—of life itself—at its most elemental and unpredictable. An image very much like this one was chosen by André Breton as one of the illustrations to his essay “Beauty Will Be Convulsive,” published in the Surrealist magazine Minotaure in 1934. Breton added a caption identifying his image as a product of automatic writing, thereby reimagining it as an exemplary art project.

In March 1896, the Russian scientist Jakob von Narkiewicz-Jodko sought to use another version of this instrument to prove the existence of a universal vital force or effluvia. A Ruhmkorff coil, a vacuum tube, and a photographic plate were linked by wire, allowing the operator to put his hand on the plate in the dark and record the resulting electrical flow (PL. 42). According to one enthusiast, the image that resulted “in every way resembled the effluvia that sensitives see coming from the fingers of a person in the normal state.” This kind of image came to be known as Kirlian photography, associated by name with the similar experiments conducted by the Russian electrical engineer Semyon Kirlian and his wife Valentina in 1939. Thanks to a coronal discharge, the body is shown as if flaring with an inner energy field, a field the Kirlians imagined could offer an insight into the physical and emotional states of their subjects. Such images promise to make visible what is otherwise beyond sight, to allow photography to venture beyond its obstinate dedication to the recording of surfaces and appearances and become, in its stead, the perfect medium.

All of these examples call on the presumed truth values associated with the photograph, and especially with the camerless photograph, to provide proof in the face of a presumed skepticism. The same motivation can nevertheless lead to the production of remarkably different kinds of images. Georges Demenỳ and Edouard Quénu are thought to have been responsible for a series of contact prints on “smoked paper” of human feet, issued in 1889, each print numbered and annotated by an explanatory handwritten text, signs of the systematic procedure of a scientific experiment. Designed to demonstrate the effects of muscular atrophy, the experiment shows a left and right foot before walking, the same feet after a four-kilometer walk, and then again standing on tiptoe (PL. 43). Compare these modest indexical footprints to another camerless photograph, made in Belfast by E. E Fournier d’Albe on June 13, 1921, as an effort to prove or disprove the claims made by celebrated Irish medium Kate Goligher. The year before, Goligher, who insisted on operating in complete
darkness, had been photographed with a flash during a séance with what appeared to be an ectoplasmic “psychic structure” issuing from between her legs. Keen to record this phenomenon for himself, at a subsequent meeting d’Albe laid some photographic paper on the floor under a table, along with two light bulbs attached to a switch, and proceeded to make a contact print of the extruded ectoplasm. The resulting image looked remarkably like a piece of woven cloth (PL. 44). Indeed, d’Albe was able to exactly imitate the result by making a contact photograph of a piece of muslin, leading him to conclude that Ms. Goligher was a fraud.74

In both these cases, cameraless photography was proffered as incontrovertible evidence, allowing us to witness what could not otherwise be easily seen with the unaided human eye. The directness of the photography, the physical contact between light-sensitive paper and the phenomena being recorded, gives these images—along with the claims being made for them—an otherwise unobtainable plausibility. Or so their makers hoped.

As we’ve already seen, the simplicity of the cyanotype process made it a favourite with amateur photographers, who welcomed the absence of a need for a darkroom, added chemicals, or sophisticated skills. Many manuals and handbooks for amateurs included sections on how to make contact prints, using this or other photographic processes. One such book was *Photographic Amusements*, compiled by Frank Fraprie and Walter Woodbury and issued in the United States in numerous editions from 1896 onward. The pages about making “Leaf Prints” trace a history for the practice back to Schulze and feature illustrations taken from an 1869 publication by Thomas Gaffield entitled *Photographic Leaf Prints* (FIG. 9). But they also remind readers that “good pictures of leaf forms are used quite extensively for nature study in school and camp.”75 A French handbook of this same kind, *La photographie récréative et fantaisiste*, published in Paris in 1908, even showcased a “photogram produced with a glowworm.”76 Paul Lindner’s *Photographie ohne Kamera*, published in Berlin in 1920, was the first book devoted entirely to the making of cameraless photographs, featuring, among its other illustrations, a contact print of a “hop tendril” and of “beer foam, eight seconds old.”77

In this same spirit, American botanist and printmaker Bertha E. Jaques demonstrated the cyanotype’s capacity to leave accurate white shadows against its blue background tones in an album of plant specimens she assembled in 1906 (PL. 45). Produced at a time when industrial modernity threatened to wholly transform society, a domestic handicraft object like this album represents a nostalgia for a simpler way of life, a nostalgia fostered by the concurrent Arts and Crafts movement and its efforts to restore traditional crafts to the mainstream. Indeed, most amateur photographs were stored in such albums, making this one of photography’s primary modes of presentation. Carefully annotated by its maker to record each specimen’s Latin and vernacular names, as well as the date of each impression, Jaques’ album is a reminder that such contact prints continued to be made into the twentieth century, even if out of public sight (PL. 46). But not, it seems, out of mind. For cameraless photography was soon to move from the vernacular to the avant-garde, being taken up as a creative practice in the early 1920s by Christian Schad in Switzerland, Man Ray in France, and László Moholy-Nagy in Germany, and quickly becoming central to ambitious artistic practice everywhere.

**The Avant-Garde**

The event that triggered this renewed interest in cameraless photography on the part of artists was the First World War of 1914–18. For many, the seemingly indiscriminate destruction that accompanied the “war to end war,” as it was sometimes called, led to a prolonged questioning of the utopian promise of modern industrial progress. As John Berger has put it: “the scale of the waste and the irrationality and the degree to which men could be persuaded and forced to deny their own interests led to the belief that there were incomprehensible and blind forces at work.”78 Many artists responded by seeking to abandon or overthrow prevailing conventions of reality, conventions associated with bourgeois society and therefore with the established social and political system. In other words, seeing itself became a political issue.

Christian Schad, a German artist who in 1919 was living in Geneva, is usually credited with being the first to reinvent the cameraless photograph as an avant-garde practice. Schad had gone to Switzerland from his native

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Germany to avoid having to fight in the war and joined the anarchist Dada movement while there. In this context, Schad made a series of cameraless photographs by placing bits of detritus—often rubbish he found in the streets, including balls of dust and sheets of newspaper—under glass on a sheet of light-sensitive paper and then leaving this ensemble of paper and objects to develop on the windowsill of his apartment (PL. 47). The gesture, a deliberately offensive abandonment of skill, precious material, or meaningful subject matter, aimed to produce an art that was entirely anti-establishment, perhaps even anti-art. To that end, Schad, best known as a painter, used “printing out” paper, probably employing a batch of paper sold for the making of homemade postcards. He thereby appropriated a vernacular, amateur practice to his artistic ends. This meant that he could watch the image develop in sunlight as it happened; he would simply “stop” the image from developing further when it looked ready. He then placed the paper in a gold-tone fixative bath, eventually cutting the sheets of exposed paper into abstract shapes in order, he said, to “free them from the convention of the square” (PL. 48). In a short time, Schad had made about thirty of these evocative yet enigmatic abstractions, all of them quite small at about 6 x 8 centimeters in size.

Schad relocated to Munich in 1920, leaving his photographs with his friend Walter Serner. Serner then forwarded them to Dada theorist Tristan Tzara, who had expressed an interest in publishing them. Schad would never be in possession of them again; Tzara published one of them—under the title Arp et Val Serner dans le crocodarium royal de Londres—in March 1920 in Dada, no. 7, and another appeared in Dadaco in Berlin in the same year (FIG. 10). But none of them was ever returned to the artist. In fact, unbeknownst to Schad, Tzara sent a number of these photographs to Alfred Barr at the Museum of Modern Art in New York in 1936, playfully calling them “schadographs” in his accompanying letter. They were then included in Barr’s influential 1936 exhibition Fantastic Art, Dada, and Surrealism, reproduced in the catalogue, and purchased by the museum. This is how they became known in the greater art world.

Tzara met Man Ray when they lived in the same hotel in Paris in 1921, and presumably showed him some of the schadographs in his possession. The American-born artist quickly began making his own cameraless photographs, both simple botanical contact prints and more complex compositions. Man Ray nevertheless claimed to have rediscovered the technique himself as a consequence of a darkroom accident in that same year. The claim that an accident was the source of his interest is a Surrealist fairy-tale in itself, allowing chance to play a key role in the genesis of these photographs. Indeed, it might be said that, in cameraless photography, chance is the author and “reality” the medium. Certainly their mode of production must have appealed to Man Ray, given his previous association with Marcel Duchamp and the provocation of the readymade. One of the first examples to be published, appearing in The Little Review in 1922, came with a hand-inscribed title in mirror-writing, esoRRose sel à vie, that recalls Duchamp’s female alter ego, and a suitably enigmatic description, Rayograph, that melds author and process into a single proper name. Unlike Schad’s photographs, the ones produced by Man Ray were made using matt-toned “developing out” paper, meaning that he couldn’t see the image he had made until he developed the paper. It also means they were first composed in the darkroom he had set up in his hotel room, under a red safe light, and then exposed to artificial white light to initiate the photographic process.

Chance is of course a relative term. Even before he became a Surrealist, Man Ray was interested in expressing and soliciting desire, and his images often have an explicit erotic content that is no accident. In one early example, two shadowy faces—belonging to Man Ray and his lover, Kiki of Montparnasse—kiss (PL. 49). Each face is imprinted with a translucent hand, and yet the whole scene remains as ethereal as a cloud. Part of the erotic content of such images comes from the difficulty of working out exactly how they were made; they remain a mystery, clouded by the unknown and perhaps even representing the unknowable. In this case, the artist seems to have made three consecutive exposures, so that faces, hands, and two darkroom trays have each left their imprint in turn, confusing any stable sense of depth and solidity.

In a short essay in a 1922 issue of Vanity Fair titled “A New Method of Realizing the Artistic Possibilities of Photography,” Jean Cocteau described these new kinds of picture as follows: “[They are] meaningless masterpieces
FIG. 11. Man Ray/Jean Cocteau, "A New Method of Realizing the Artistic Possibilities of Photography," Vanity Fair, November 1922

A New Method of Realizing the Artistic Possibilities of Photography

Experiments in Abstract Form, Made without a Camera Lens, by Man Ray, the American Painter
in which are realised the most voluptuous velvets of the aquafortist. There has never been anyone else who has been able to produce anything like this scale of blacks sinking into each other, of shadows and half shadows? [sic] He has come to set painting free again. His mysterious groups are infinitely better than any of the ordinary still-lifes which attempt to conquer the flat canvas and the elusive mud of the colors" (FIG. 11). The examples reproduced with this little essay are sometimes quite simple ("A Comb Entering the Gyroscope—a delicate and finely patterned abstract study in white, gray and black") and sometimes more complex ("Composition of Objects Selected with Both Eyes Closed. This suggests the modern artistic passion for machinery").

In 1923, after being asked at short notice to submit a film to a Dada soirée to be held at the Théâtre Michel in Paris on July 6, Man Ray extended his rayograph technique to film stock, sprinkling salt and pepper on one piece of unexposed film and pins on another, before illuminating and developing each. He then added some camera-made footage to make up a three-minute film of disassociated sequences, including hallucinatory images of the nude torso of his model, Kiki of Montparnasse, illuminated in striped light against a window. Man Ray gave this film, his first, the suitably provocative title Le retour à la raison (The Return of Reason). In the same year, he made a rayograph from a spool of this same film stock, allowing it to uncurl onto his horizontal paper so that occasional glimpses of Kiki’s body are made visible there, a mini-movie distilled in a single picture plane (PL. 50).

It should be noted that Man Ray sometimes rephotographed his unique compositions in order to be able to issue enlarged, multiple-print editions of these same images; in other words, to make them no longer unique. In 1922, for example, he produced a volume of twelve rephotographed rayographs that he printed from negatives, issuing them as Champs Déllicieux: Album de photographies (Delicious Fields) in an edition of forty numbered copies (PL. 51). This allowed them to be relatively widely distributed and sold. These photographs, in other words, were the product of commerce, not of chance. The title recalls Les champs magnétiques, or “the magnetic fields,” a set of automatic writings published by André Breton and Philippe Soupault in 1920, thereby drawing a direct analogy between Man Ray’s use of cameralless techniques and Surrealist automatism. Tzara wrote a preface for Champs Déllicieux in this same spirit: “When everything we call art had become thoroughly arthritic, a photographer…invented a force that surpassed in importance all the constellations intended for our visual pleasure….Is it a spiral of water or the tragic gleam of a revolver, an egg, a glistening arc or the floodgate of reason, a keen ear attuned to a mineral hiss, or a turbine of algebraic formulas?” The portfolio was reviewed by Karel Teige in the Czech magazine Zivot soon after it was issued: “Photography acquires here its own, self-determining, autonomous speech…Photography can never leave reality, not even here, but it can become surrealistic.” Teige went on to reproduce one of these rayographs in his 1925 book Film, as if to demonstrate the possibility of transforming everyday objects into a form of symbolic abstraction.

Man Ray’s cameralless photographs often combine identifiable and/or evocative things (a slinky, a hand, a spool of film) with entirely amorphous forms or with splashes or wedges of light and dark, as if everything we see is suffused with, or is even composed of, water vapor or smoke or perhaps a luminous ether. Some examples coalesce into recognizable compositions (a face, its identification as such aided by penciled-in eyes), but some remain indescribable, hovering between a vaguely humanoid abjection and complete abstraction (PLS. 52–54). In line with Surrealist thinking, such works are intended to induce a response before thought, an expression of the viewer’s own unconscious desires and apprehensions. To name what we see in a rayograph is to give up something of oneself.

The most influential of the various pioneering avant-garde artists who took up cameralless photography in the early twentieth century was the Hungarian-born polymath László Moholy-Nagy. Having moved to Berlin in 1920, Moholy seemed to have first encountered amateur photographers making botanical contact prints in July–August of 1922 during a visit to a school in Loheland. Encouraged by his wife Lucia, Moholy-Nagy began working with the process. Further impetus came from his attendance in September 1922 of the Constructivist/Dadaist congress at Weimar, where Tristan Tzara showed some rayographs by Man Ray. Inspired by these examples, Moholy conducted a series of systematic experiments, beginning in late 1922. Among other procedures, he passed light through a variety of translucent substances, such as fluids like water, oil, and acids, as well as through crystal, metal, glass, and tissue, and then onto his light-sensitive paper to produce layered, abstract pictures. He called these “photograms.”

One early photogram was produced on printing-out postcard paper and is therefore sepia in tone and with spaces for an address and correspondence printed on the back (PL. 55). It was published in the March 1923 issue of Broom:
Geoffrey Batchen, Philomena Mariani

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