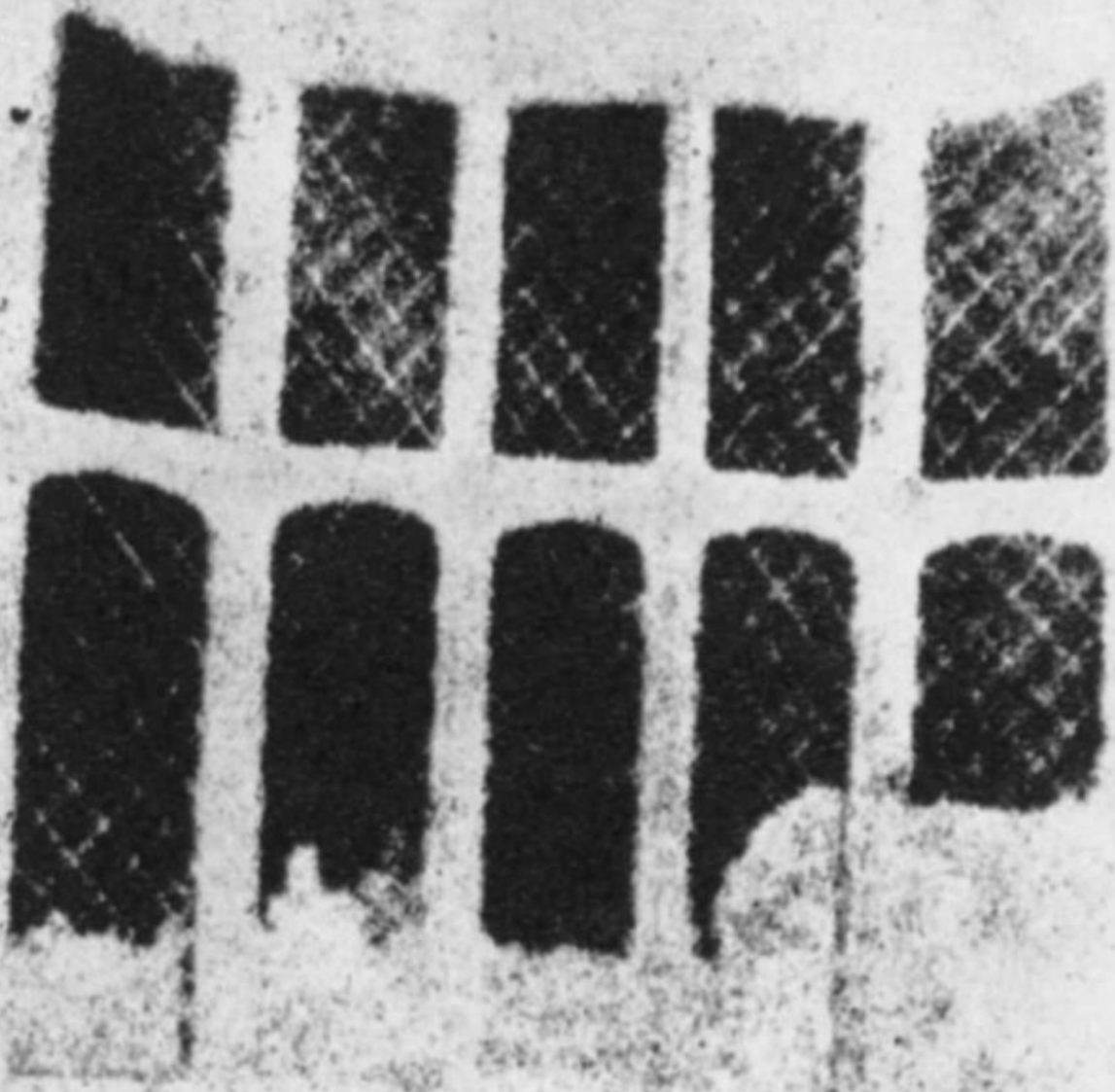
The History, Theory and Practice of Primitive Photography



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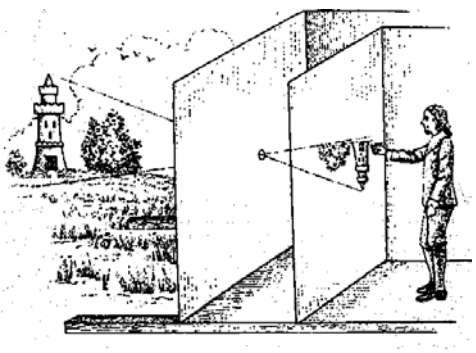
MARCH 2009

I: A Brief History Of Early Photography: "From Caveman To Calotype"

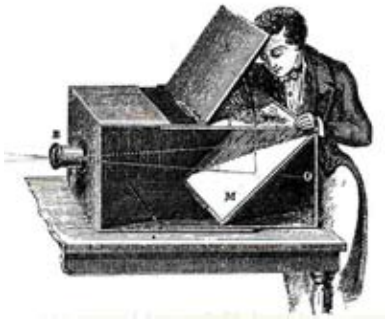
As with all of the visual arts, from cave painting to digital animation, photography is rooted in the wish to capture the image of something which has been deemed worthy of cataloguing. The desire to achieve a more exacting and "life-like" image and to do it quickly is the force which ultimately lead to the advent of photography. The idea that an image can be observed in a dark space with a hole in it is a very old one. The first recorded details of this discovery speak of the philosopher Mo Ti[1] of China who found that, if reflected light were to pass through a very small hole (a pinhole) and into a very dark space, an inverted but quite perfect image of the object emitting that light would be produced in the form of a projection. Two centuries later, Aristotle[2] observed and recorded the same phenomenon when an image of the sun was projected upon the ground as its light passed through a small hole between a grouping of leaves. As years passed, others discovered various properties of the pinhole. It was found that as the hole through which light passed was made to be smaller, the projected image became sharper. Different contraptions were created based on the pinhole phenomenon which allowed for one to observe a solar eclipse as a projected image,[3] thus sparing the eyes from the direct light of the sun. These discoveries provided the basis upon which the idea of the camera was conceived.

It was during the Renaissance that these ideas were put to use as artistic tools. The earliest description of a kind of camera-like device came from Leonardo da Vinci.[4] This instrument was called the "camera obscura" or "dark chamber." It was composed of a dark room with a small hole on one wall. An inverted image would be projected upon the opposite wall. An individual would enter this room in order to implement it as a drawing aid. Thus, the user would be inside of the camera. Since the projected image was a perfect reproduction of an object which reflected light and, more specifically, of linear perspective, it was very useful to the artists of the time. Images in the camera obscura could be traced by the artist, and colors could be accurately observed and reproduced with paints.



Various improvements to the camera obscura included the use of a mirror to counteract the inversion of the image, the use of curved glass to intensify the brightness and sharpness of the projection as well as the creation of a kind of diaphragm which could be used in conjunction with the glass to manipulate the sharpness of objects in front of and behind the prime subject. These inventions later translated into the lens, the aperture control and the single-lens reflex camera.[5]

By and by, people learned to condense the camera into smaller manifestations. These "portable" camera obscuras looked and operated, in some cases, very much like modern day large-format cameras.[6]



They were composed of a lens, a kind of aperture which allowed for the adjustment of the depth-of-field and a piece of "ground glass" upon which light was projected and tracing paper was laid so as to aid in the drawing of an image. Numerous improvements to the camera obscura were made, and other devices which utilized the properties of the camera were created (one of which, called the camera lucida,[7] a stick with a prism attached to it allowing the operator to look at the drawing surface and the subject simultaneously, would have great importance later in the creation of a particular photographic method), but all of them still were intended to be used solely as drawing or painting aids. Indeed, the camera had a great impact on the art of the day, changing the way illustrators and painters composed and "balanced" their images and regarded the portrayal of light and its various colors. Jan Vermeer,[8] who is revered for his extreme precision in painting and his ability to create works which are wonderfully "life-like," in fact used camera-based drawing aids to achieve his somewhat unorthodox imagery. His attention to depth, multiple points of focus, the objects

which appear on the margins of the work as well as his unmatched skill in portraying reflected light all were due, in part, to his use of the camera as an artistic aid. (He also was simply a great painter – camera or not).

The advent of the practice of alchemy, and later, its refinement into modern scientific practices such as chemistry, proved to be an important catalyst in the quest to "mechanically" make images via the use of the camera. In the early seventeenth century, it was noted that silver salts were light sensitive. Upon exposure to sunlight, silver salts (particularly silver nitrate) were found to turn absolutely black. With the invention, improvement upon and fusion of the practices of printing (such as lithography),[9] mass production, chemistry and camera technology, it was projected that ways to "mechanically" record images directly from life would emerge in the near future. All of those elements which are necessary for the ability to make photographs existed; it was up to inventors to combine them into a working process.

Many people made advances towards the creation of a photographic process through the use of silver nitrates and other chemicals in the eighteenth century, but it was not until the nineteenth century that modern photographic methods were created. As with many inventions, it seemed that the time had come for this innovation, and it occurred in many different locales and in many different minds all within a very small time period. Many of the inventors of photography had little or no knowledge that others in different parts of the world were also on the cusp of creating ways of "automatically" recording images directly from life.

Enter Joseph Nicéphore Niépce[10] – inventor of odd things. These things included the "Marly Machine" – something designed to pump water to the emperor in the palace of Versailles, a bicycle precursor which lacked pedals and required the rider to push him/herself forward via foot power, and most notably, the internal combustion engine. After inventing these things, he set his sights on a much more practical and important enterprise than that of public transportation or water management: this was the practice of drawing. He enjoyed the idea of drawing and especially of printmaking from woodcuts, lithography and such.

Unfortunately, he was horrible at all of these things due to his lack of both training and physical coordination. These shortcomings inspired the man to work towards the creation of a system which could automatically draw objects for him. Niépce, being a competent, scientifically inclined individual, had knowledge of the practice of chemistry and most importantly, knew a good deal about those chemicals which reacted to sunlight.

Niépce' first attempts at recording images directly from nature via the effects of light were rooted in his partiality to and his understanding of the process of making lithographs. He sought to record images directly to a lithographer's stone for subsequent mass production. He began to experiment with the placement of various light-sensitive chemicals upon papers and then the exposure of these to reflected sunlight filtered through the lens of the camera obscura. Because he was only able to achieve a "negative" image with these experimentations, he looked for other methods of achieving his goal. He was successful in creating positive images with a number of non-camera based methods but these were centered upon engravings as opposed to reflected light from natural objects. When he discovered that a substance used to create lithographs, called bitumen of Judea, was light sensitive, he finally had devised a method which was sufficient for use in conjunction with the camera. Niépce dissolved the substance in lavender oil, which created a kind of photographic emulsion. He then coated a lithographer's stone with the mixture and used a camera to focus reflected light upon it. This created a latent image[11] which was then processed in a solution of petroleum and lavender oil. The end result was a "direct-to-positive" but irreproducible image which was hardly "pristine" looking. Also, bitumen of Judea is very slow in its reaction to light, making this process one which required extensive time to execute. Niépce was quite aware of the shortcomings of his discovery and sought to improve upon it. However, he had, in fact, finally realized the vision of the

"automatic" reproduction of a natural image via reflected light and the usage of the camera. He called it a "point de vue."[12]

People seem to enjoy arguing as to whether he was able to accomplish this in 1826 or in 1822 or in 1827 or some other year. His son, Isadore, wrote in 1841 that the first camera-based image was achieved in the year of 1824. Niépce did continue to modify and improve upon his method, eventually settling on one which was based upon pewter (and later silver-coated copper). These he dubbed Héliographs. Although this is a highly contentious issue among those in the photographic community, I'm going to go out on a limb here and declare that the heliographic process was the first method of making what we would today call an automatic drawing. The oldest known of these (which was produced, obviously, with the Heliographic method) was made by Niépce. He pointed his camera out of his studio window looking out upon the rooftops of Le Gras in France.

The photograph was lost for about a hundred years and then recovered; it can now be viewed at the University of Texas. Niépce's contributions to the improvement of the process of making photographs would, for all intents and purposes, end with the heliograph.

In the early 1800s, some people began to design horror light shows which were based upon a new device, then called the "magic lantern"[13] (a precursor to the modern day slide projector). Users of the magic lantern gave themselves the rather dignified title of "scene designer." These scene designers used projected light to achieve effects which, at the time, seemed extra-ordinary. The best of these people were able to make lots of money and get in good with those who were the celebrities of the time (i.e. actors, operatic singers, visual artists and philanthropists) thus becoming officially "bona fide." Of all "scene designers" of the era, Louis Jacques Mandé Daguerre[14] was, by far, the most bona fide.

And this is how he was able to achieve his success: he built a huge cylindrical room which was enshrouded with an inner layer of window material – a half circle of which was coated in a kind of opaque lacquer and the rest of which was left to be clear. Behind the clear window material he hung linens with ghosts and skulls and other things painted upon them. He projected light over the front of the covered windows and also through the rear of the linens and clear glass, thus creating the illusion of ghosts and skulls floating through the air. Since it was fashionable at the time to carry around swords or canes or sticks, it was not surprising that upon a paying customer's first experience inside Daguerre's "panorama" the viewer would either try to swing whatever they had in the direction of the skulls which floated near them, or they would simply run away. Daguerre made further improvements to his "trompe-l' oeil" (deceives the eye) with the inclusion of ropes and pulleys which could control the light sources and also living animals and sound effects.

Although Daguerre's scene designing didn't share too many of the elements which were present in Niépce' invention, when he heard of the heliograph, Daguerre showed extreme interest. This is because he did have quite an interest in the arts, lighting effects and especially, making money. He began to correspond with Niépce and they agreed to share ideas with one another in order to improve upon the heliograph. Interestingly, the two wrote to each other in a coded form so as to avoid tipping off any competitors in the community of photographic inventors. Unfortunately, before much could be accomplished, Niépce died of a stroke. Young Isadore attempted to fill his father's place in the venture but, sadly, had quite little to contribute.

Daguerre trudged on, however, and, based on the experimentation which had occurred during his late partnership, he began to use super-polished plates of silver-coated copper as a base for his photographs. He sensitized these plates with hot silver iodine vapor and then immediately made long exposures (around one hour) to produce a very nearly faultless negative image of the subject. These plates were difficult to view as one had to hold them at varied angles in order to see the positive image. They had a sort of three dimensional quality which increased their mysteriousness and their appeal. As one tilts a daguerreotype portrait laterally, the eyes of the subject seem to follow those of the viewer.

A few years later, Daguerre began to coat his exposed plates in hot mercury vapor. This action, he found, both reduced exposure time to less than twenty minutes and created a kind of silvery crust where the sensitized plate had been exposed to sunlight. All of this was saved from corrosion in a simple solution of table salt and water The result was an image which was extremely fragile, nearly impossible to reproduce, and still to this day, unmatched in its eerie perfection and strange majesty. In a state of absolute manic euphoria, "ad absurdum" as some might say, shaking from head to foot with tremors of absolute exhilaration, nearly foaming at the mouth with passion, Daguerre cried out upon his first success: "I have found a way of fixing the images of the camera! I have seized the fleeting light and imprisoned it! I have forced the sun to paint pictures for me!" (Hirsh 20) And subsequently he fell back onto his horsehair sofa, in a state of utter exhaustion, nearly as exhausted as any man can possibly be.

After hearing of Daguerre's successes, a magnificent renaissance gentleman in England of nearly unmatched personal and social integrity named Sir John Fredrick William Herschel made it his duty to share his knowledge in the area of photography with Daguerre. Herschel told Daguerre that in his photographic exploits, he had discovered that hyposulphite of soda fixed his camera produced images. This was the final piece in the puzzle for Daguerre, and thus emerged the Daguerreotype – the first commercially viable form of creating "automatically drawn" images from nature.

Since Daguerre was lucky enough to be bona fide, he was able to recruit big name administrative authorities to promote his invention, and because of this, he received a lifetime incremental income from government of France. Even poor little Isadore was awarded this same benefit. As a compensation for the award, the French took the liberty of revealing the invention to the rest of the world (with the exception of England, of course, because everyone in France hated the English). Daguerre made up a sort of instruction booklet for potential Daguerreotypists and, given his entrepreneurial background, created an infrastructure which allowed for the sale of cameras and various lenses to the public. There was a subsequent "Daguerreotype-mania" or "Daguerréotypomanie" which was somewhat akin to the "Beatle-mania"[15] of the mid nineteen sixties. Everyone had to have a portrait "taken" of themselves to show their friends. They would then take their little daguerreotype and set it on the mantle where few would see it. You see, nobody would want to give away their precious daguerreotype because it was irreproducible and therefore one-of-a-kind.

The thing that made the daguerreotype such a hit in the day was the fact that, in comparison with the price of having one's portrait painted by a highly skilled professional (which was reserved only for the rich aristocrats), the daguerreotype was relatively cheap and therefore accessible to the lowly of birth. Nearly everyone could have a likeness of themselves made with the daguerreotype, which was quite a favorable phenomenon at the time.[16] Likewise, things which were also inaccessible to the poor, like travel and sightseeing, could now be recreated in a second rate sort of way as almost everything in the world (such as the pyramids or the Parthenon) was now being fanatically recorded by way of the daguerreotype.

Now is when things in the world of "automatic drawing" become particularly murky, with proletarians and the bourgeoisie and capitalistic issues as well as the entrepreneurial spirit thrown into the mix. Most of all, of this can be summed up in this way: the making of the daguerreotype portrait became a booming business which operated somewhat like a facility run by way of the assembly line. "Artists" looked down upon daguerreotypists and thought of them as laymen who followed instruction manuals and had absolutely no talent.[17] Photography as art had not

yet been conceptualized. Everyone, the poor and the rich, got in line to have their "pictures taken."

Having one's portrait made via daguerreotype was a painful process because of the length of time necessary for a sufficient exposure to be made. Most portrait studios were located on the top floor of a building with a skylight positioned somewhere on the ceiling which would direct overwhelming amounts of sunlight into the eyes of the sitter, who was positioned in a special posing chair which held them in place with rods that touched on various pressure points on the body (especially on the neck). Even though portraits were made only on very sunny days so exposure time could be reduced to just a couple of minutes, the sitter was invariably driven to tears by the awful light into which they were forced to stare directly.[18] Tears were almost always part of the portrait making occasion until "painless" daguerreotypists emerged who added opium to the process.

Daguerre, himself, living on his meager government pension, was not paid royalties upon someone else's use of his system because of his decision to allow France to freely present the advent of the daguerreotype to the world. He did not engage in a daguerreotype portrait business of his own and, after 1839, turned his back on the idea of "automatic drawing" and the daguerreotype almost entirely.[19] Then his panorama burned down, and he became very poor. He died after falling into a wretched state of obscurity.

Now, even though the French had excluded the English people when sharing the details of the daguerreotype with the world, the word did eventually get out that the idea of "automatically drawn" images had been officially realized. The English super-gentleman, William Henry Fox Talbot, who had invented his own photographic process earlier in the 1830's, immediately sent a number of papers which outlined his method to the "Royal Society" (of which he was a prominent member). Now, let us regard William Henry Fox Talbot and English society in his day for a moment before proceeding on to a description of his photographic endeavors.

First, it must be known that in mid nineteenth century England, in order to be considered a legitimate gentleman (and this was a very desirable quality), one had to be a renaissance man; meaning in order to qualify as a gentleman, one had to have at least some knowledge of and ability in every major discipline. A short list of categories which included these disciplines might look something like this:[20]

1. Geography
2. Entertainment
3. History
4. Arts & Literature
5. Science & Nature
6. Sports & Leisure

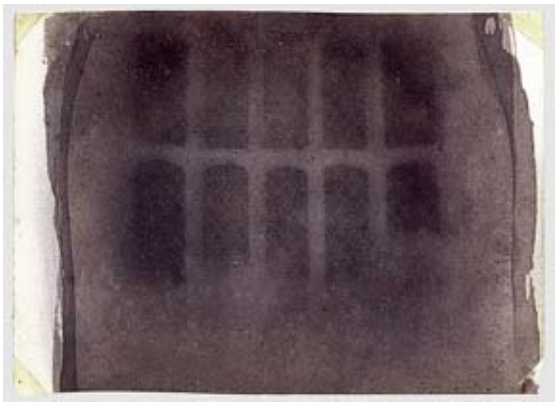
William Henry Fox Talbot was fantastic at almost everything. He had attended Cambridge University, where he received an incredibly well rounded education and achieved a Master's level degree in the arts (both visual and literary), he was a marvelous scientist and had been elected to the "Royal Society" mentioned previously, he had traveled all over the planet, he had a taste for the most absolutely "inaccessible" music (i.e. difficult for the layman to understand), he was heavily involved in politics, serving as a parliamentary figure, he was a sheriff and he was a spectacular athlete. On top of all of these skills he also owned an obligatory estate and was married to an obligatory uncommonly beautiful and intelligent woman.[21] Only one thing prevented him from being the most legitimate gentleman possible and this was the practice of drawing. The fact that he was horrible at it and that it, in a small way, tarnished his gentlemanly image, was absolutely infuriating to him. He was so awful at drawing that even the aids of the day, such as the camera lucida (which initially sparked his interest in the effect that a lens can have on light), could not help him overcome his difficulties. It was a problem concerning the steadiness of the hand, and this indeed, is a very grave problem when it comes to the practice of drawing. If he was to become a full-fledged gentleman, he would have to conceive of a process which would allow him to make images from the natural world

automatically. So, being the renaissance man that he was, he did. He said himself that he conceived of the method whilst on his honeymoon at Lake Como in Italy. Later in his life he commented on the exact moment when the idea which would later become a photographic process came into his mind. He gazed out upon the streak of moonlit water on the surface of the lake:

> And this led me to reflect on the inimitable beauty of the pictures of nature's paintings which the glass lens of the camera throws upon the paper in its focus—fairy pictures, creatures of a moment, and destined as rapidly to fade away.... It was during these thoughts that the idea occurred to me... how charming it would be if it were possible to cause these natural images to imprint themselves durably, and remain fixed upon the paper! (Hirsch 15)

William Henry Fox Talbot performed a number of experiments while on the road to creating his photographic process. These involved various chemicals which contained silver salts, and he achieved success incrementally. First, he learned that if he coated paper with sodium chloride and then "sensitized" them later with silver nitrate, silver chloride was formed, and this substance reacted relatively quickly to sunlight. He could expose the treated paper, which would immediately darken to form an image – there was no development. The result was the production of a negative image. He fixed his papers in a mixture of table salt and water. His called his first successes "photogenic drawings,"[22] and these were created without the use of camera and lens. They were "contact" prints of things like leaves and doilies. Obviously he was not satisfied with a negative image of his subjects, and so he made contact prints of his contact prints, thus producing a positive image. He had conceived of the first negative/positive photographic process, which is what nearly every process was based upon until the coming of this abominable digital age.

Using this original method, William Henry Fox Talbot could not create negatives which were dense enough to produce positive images of satisfactory detail. Not to worry, though. Since William Henry Fox Talbot was gifted with such a scholarly and endlessly inquisitive mind and constantly operated with a "never say die" attitude, he prevailed, and came up with



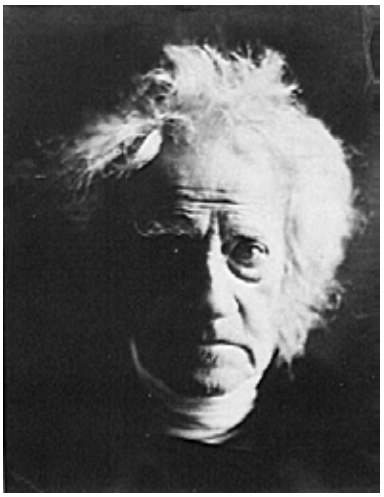
a way to make better photographs. He decided to try obsessively alternating between coats of sodium chloride and silver nitrate until layer upon layer had been applied to the paper. Upon experimentation, he realized that in doing this, he had drastically decreased necessary exposure time – so much, in fact, that he was able to make his first legitimate camera-based images.

The cameras which he instructed his personal carpenter build were tiny, and they produced fittingly tiny images – so tiny in fact, that they needed to be viewed through a magnifying glass. William Henry Fox Talbot didn't care that they were so small, though. He had succeeded in making images which were so pristine that even a drawing which flowed from the beautiful hand of Jan Vermeer could not come close to matching them in terms of detail. William Henry Fox Talbot had become the ultimate gentleman and thus, he was done with photography. That is, until a few years later, when the news of Daguerre's "invention" struck! How disgraceful! William Henry Fox Talbot had invented photography! How could another man, a Frenchman, have done so first? William Henry Fox Talbot took up the issue with his fellow Royal Socialites.

Regardless of the thought that the daguerreotype had beaten his own method in the race to be the first to "automatically draw" images from nature, William Henry Fox Talbot continued to work on and to improve upon his method. One day, for some odd reason, he decided to coat an iodized paper negative with gallic acid before he exposed it. When he finally made the exposure and went inside to view it, there was no image to be seen upon the paper, and so he went off to make a new photograph. But when he came back, the iodized paper had produced a very nice image. It was then that he realized that the gallic acid could act as a kind of developer when used in conjunction with an exposed piece of iodized paper. He had created a new and much better method of making photographs. He initially called it the "talbotype" but later changed its name to the "calotype."[23] Being a gentleman, William Henry Fox Talbot was completely fluent in Greek, which is what the word "calotype" is rooted in. In Greek, "kalos" means "beautiful" and "tupos" translates to "print," so naturally William Henry Fox Talbot combined the two into "calotype," meaning "beautiful print" – a perfectly logical and gentlemanly title for his invention.

It is now that I shall submit my own opinion as to whom the title of "the true inventor of photography" belongs. And here it is: there were so many figures (going back to the age of the cavemen) whose ideas melded into the force which finally created what we think of today as "the photograph." A case could be made in Niépce's favor, in that he was the first to create a fixed, camera-based image captured from the natural world. A case could be made for Daguerre, a very good one, as he was the first to create not only a commercially viable "automatic drawing" method, but one which could produce almost inconceivably detailed images. Not to mention, his invention was the first of its kind to be officially announced to the world. A good number of legitimate cases could be made for others – people before Daguerre or Niépce – who experimented with silver salts and made contact prints or silhouette-based images. However, it is my belief that it was William Henry Fox Talbot who was the first to create what we would now refer to as a photograph. You see, the difference between what William Henry Fox Talbot invented and what Niépce or Daguerre or others created lies in how one defines exactly what the traits of a photograph are. Inherent in my definition of a photograph is the negative/positive process which allows for the conceptually unlimited reproduction of a single image taken from nature. The daguerreotype and the heliograph and other inventions in the same vein do not fit that definition, and that is what to me makes them part of the category of "automatic drawings" and not part of that of the photograph. In short, my answer to the question, "who was the first to make a genuine photograph?" would be: "William Henry Fox Talbot." However, the title of the most respectable photographic pioneer would go to Sir John Fredrick William Herschel.[24]

Herschel invented at least the pieces of the precursors to almost every modern photographic process. Blueprinting, photocopying, glass-based negatives (which are celluloid predecessors), and color photography can all by traced back to the ideas of Sir John Fredrick William Herschel. It can also be said that it was Herschel who developed and introduced a kind of "lingua franca" to the world which became the proper and universal vernacular of photography among its multinational practitioners and viewers. His distaste for nationalism and favoritism and his simple desire to advance society through the free sharing of knowledge are truly what made "automatic drawing" and photography achievable. It was Herschel who provided the missing piece to each inventor's puzzle – the issue of fixing. Fixing may be the single most important step in making a photograph, for if one does not fix, one would never be able to look upon their image for fear of destroying it by way of the very force which makes photography possible. So if I were to assert that it was William Henry Fox Talbot who was the inventor of the first true photographic process, I would also declare (probably without much of a disagreement with the statement on the part of my contemporaries) that Sir John Fredrick William Herschel was and is the sort of "pater familias" of the photographic world.



When the calotype hit the scene in the early eighteen forties, daguerreotype-mania was already in full bloom. People were used to their nearly faultless, super polished, leather-encased, one-of-a-kind objects. When these individuals looked upon the warm, seemingly soft-focused, high-contrast and quite imperfect calotype with its darks bleeding into the very fibers of its "repulsive" paper base, the reaction was much less than positive.[25] Why would anyone want something so flawed when they already had something so perfect? The calotype seemed like a step back from what people were accustomed to.

Adding to the dismal reception of the calotype, William Henry Fox Talbot patented the process in England and forced practitioners to pay high priced fees which he then received as royalties.[26] This limited those in the calotype making business to the well-to-do. Departing from his characteristic ultra-gentlemanliness, Talbot became obsessed with making money with his invention rather than further perfecting it. This was quite a change from his previously academically-influenced desire to constantly pursue the advancement of his personal knowledge, and his revulsion for the practice of resting upon one's laurels, so to speak. This is, for me, an immensely personal disappointment, as I have always looked upon William Henry Fox Talbot's early life as a perfect model for an ideal existence. So you can see how this change in his behavior might manifest itself as quite a blow to my figurative midsection.

The earliest of the calotype or "salted paper" prints were made either by Talbot himself or a number of his gentlemanly colleagues.[27] There are some genuinely brilliant images which were made by these people; however, since so few minds were involved in the making of calotypes (because of the high licensing fee) little progress was made as to the improvement of the process. Interestingly, since English patent restrictions had little influence in France, the French were free to use the process and more importantly, to toy with it, as much as they wanted. It was the French who became the best calotypists and who began to think of the photograph as something more than just a mechanical process, something having an aesthetic dimension – something approaching an independent art form.

As the French partook of the calotype process, they made numerous technical discoveries which drastically increased the tonal range of prints, accelerated exposure times and generally improved image quality.[28] In 1851 an exhibition was held in London which featured the best art of the day and placed a particular emphasis on the technical advances which were changing the face of what was regarded as art. It was not surprising that the French won all of the awards in the calotype division as they were far better versed in its practice than the English. This was an unimaginably appalling disgrace to the English people for a few reasons:

1. Everyone in England hated the French people and therefore the idea of being beaten by them in any manor was horrific.
2. Being beaten by the French at a practice which the English themselves had invented was an awful tarnish on the reputation of all English gentlemen – especially William Henry Fox Talbot.
2. The idea that all of this could have been avoided if only William Henry Fox Talbot had dropped his ridiculous patenting obsession delivered a theoretical shower of salt to the already terrible wounds mentioned above.

Seeing as even his closest gentlemanly allies had turned against him, William Henry Fox Talbot finally ridded the world (at least in the

private sector) of his appalling licensing fees. In his years as a member of the elderly community, he was able to redeem himself in a way by continuing on with political and scientific work before succumbing to what even the highest of pedigree cannot escape: death. However, he died a gentleman, and that is all that is important.

On a different note, Daguerreotype portrait-makers and calotype-making pioneers alike finally began to recognize the benefits of the negative/positive process and its ability to produce (conceptually) unlimited prints. Whereas the daguerreotype was an object which only its owner could enjoy, a calotype-based image could be copied and pasted into books, newspapers and most importantly, objects called "pamphlets," which were inexplicably popular in the era. For the first time, a grossly ill-travelled individual could look upon the Sphinx in Egypt or the Taj Mahal in India or whatever else had been photographed via the calotype method, widely printed and made available to the public. With the reproducible quality of the calotype, photography had become a new means of mass communication, and this was a very magnificent advancement in the scheme of things when it came to the positive progression of the human condition.[29]

There are a few points (and it is quite apparent that they are interconnected) which I have not touched on which I now wish to address. Until the advent of the calotype, the daguerreotype, and automatic drawing as a whole, had been almost entirely confined to the portraiture business.[30] The calotype's reproducibility made photographing objects other than people a practical undertaking. However, I believe that the phenomenon which solidified the negative/positive process as the prevailing method of making photographs was the feasibility of editing the image after exposure, during printing, via dodging, burning and other methods. With the direct-to-positive quality of the daguerreotype, the prospect of editing after exposure was quite an unattainable one. You see, the ability to edit the photograph with one's hands or with other objects or via some sort of chemical process is one of the most important qualities which make the photograph an art form rather than a plainly mechanical process. Indeed, it was the calotype which ushered in an environment in which a very complicated and fiery debate concerning the nature of photographs could take place. Is the photograph a separate art form and can its practitioners be called skilled artists, or is photography simply an aid to disciplines such as architecture or "high art," such as painting or sculpting?[31] This is an ongoing debate which has been present as long as the photograph has existed and is still on the minds and tongues of modern-day intellectuals.

The final point that I would like to touch upon which concerns the calotype is its aesthetic quality, and the difference in that quality in comparison with the daguerreotype.[32] You see, as mentioned above, when people first compared the two mediums, it seemed obvious that the daguerreotype was far superior to the calotype as it was nearly perfect, clean, polished and sharp while the calotype was a simple piece of paper which had an almost unfathomable list of imperfections attached to it. However, as time passed, people (mostly photographic practitioners) began to view the calotype as actually more lifelike than the daguerreotype. The world is not a perfect place. It is composed of dirt and chemicals and strange animals and uneven fences and crumbling houses, among other things. I shall now, for the benefit of reader, submit an analogy. The daguerreotype is to the calotype what "Star Wars" is to "Alien". "Star Wars" depicts the future as unblemished. Everything is polished to a lustrous finish, people don't seem to bleed; there exists no dirt nor rust – physical imperfection is hardly noticeable. In "Alien," the future is portrayed in the opposite fashion – outer space is roamed by giant, dark and oily freighters. People have disheveled hair when they awake, people eat, people drop things, people sweat. People still make mistakes. The flawed, temporal quality of human life is

brilliantly reflected in the film's atmosphere. Life is not perfect, and the calotype embodies this in a very sophisticated way. The medium produces a softly focused image in which lights and darks are represented in a raw but charming chiaroscuro, and the bleeding of the chemistry into the fibers of the paper generates a warmth which reproduces the flaws which are intrinsic to this life. It is because of all of this and some other issues that the calotype and its successors eventually won out in the battle that decided the path which photography would follow in its wonderful but ultimately entropic future.

II: An Explanation Of Intent: "A Method To The Madness"

Now that I have written the history of photography up to the end of the calotype era with the intent of contextualizing my upcoming ventures in the photographic realm, I shall explain the reasoning behind my unusual partiality to the calotype method. Let me begin by making a definitive statement: I have always been fascinated with what was once glorified as the absolute cutting edge and is now viewed as the most obsolete and antiquated. The reasoning behind this fact is nearly inexplicable; however I shall do my best to elucidate what even I, myself, do not yet fully understand.

My basement is filled with evidence of my interest in outmoded technology. The earliest home computers are strewn about on the cement floor. Half finished, paper-covered wooden airplane models lay on the tops of the computer monitors. The license plate from my first automobile, an archaic Japanese quasi-sports car, is balanced on the tool bench. Boxes of super-8 film cameras, view cameras, instamatic cameras, straight to VHS cameras and my first Hi-8 cameras lie about. My video game system collection with hundreds of cartridges and discs has been saved in the most pristine condition possible. Even my shoes, dating back to my first pair, which are approximately two inches long, are trash-bagged and saved away in the corner. What is it in the outmoded and the antique that fascinates me? I shall illustrate my answer to this question in the form of a parable:

A man is thirsty and yearns for a glass of milk. He knows that the source of the milk is a cow. He also knows that there are a couple of ways of getting milk from that cow. One way which could be employed uses an automatic milking machine complete with metal "hands" that milk the cow. The milk flows through a system of pasteurization and homogenization machines and then is bottled and brought to a store where the man could buy that bottle and drink his milk. With this method, he would never have to even see the cow or think about the cow in order to drink the milk.

Another way to achieve a glass of milk is to build a three legged stool – this involves a saw, a hammer and some nails. To put the stool next to a cow which the man has raised since it was a calf. To put his hand on the side of the cow to calm her down and then to milk the cow with his own hands to produce a glass of milk. There is a kind of man who chooses the first method of obtaining milk and there is a kind of man who chooses the second. To which of the two goes the sweeter tasting milk? I believe it is the one who takes the obligatory but supremely intimate steps to obtain his own milk with his own hands ,and it is because of this belief that I am one of those who are inclined to choose the latter method. Either way, I get my glass of milk, but I prefer a process which is humanizing as opposed to alienating.

It is possible to "take" a digital photograph, transfer it to a computer and then use a specialized program to make that photograph appear as a calotype appears – soft, rich in its dark tones and strewn with what looks like the grains of various salts. This process is very different from the one which involves building a camera from nothing but sticks of wood and pieces of glass; using silver salts and common papers to create "negatives," and using light to create the latent image which is held to the paper and then released to the eye upon development in a chemical solution. It is a beautiful experience to hold a negative in my hand and to look at it through the light of the sun. I have always chosen the celluloid negative over the digital process and now I choose the most rudimentary method of making photographs over the celluloid.

One of my various contemporaries who expresses dissent in regard to my romanticizing of this "hand to mouth" style of photography might ask (maybe with a tinge of animosity) "Why spend eight weeks building a camera out of wood when you already have the machines with

which photographs can be made? Why practice an outmoded and painfully flawed technology?" To those questions I would reply: "Yes, in this age we have access to ready-made machines and aren't forced to regard the actual process of making photographs. In using the most modern of picture-making devices we focus on product as opposed to process. Product, the "pathos" of the photographic practice, is a road which I have traversed on many occasions. I have tried to transfigure light into poetry which speaks to my place within humanity and even the broader subject of the human condition itself. Having traveled upon this road, I have developed a distaste for its dreary familiarity and am now almost entirely consumed with a solitary interest in the simplest fundamental of photography: Light and the practice of capturing it. I believe Daguerre best expressed the rewarding quality of the process of making an image not long after he had successfully made his first exposure. I will repeat that which was already noted in the prior section:

> "I have found a way of fixing the images of the camera! I have seized the fleeting light and imprisoned it! I have forced the sun to paint pictures for me!" (Hirsch 20)

I now wish to force the sun to paint pictures for me and have nothing but my hands to thank for the joy of doing so.

The most tragic of things to consider with respect to an individual human being is the thought that at one time, every adult was a completely "innocent" child who had the naïveté, if you will, to feel infinite and inconceivable joy. The future had possibility, and at that moment, the young person had parents and had people who loved him/her. And then one considers the present. There is no glorious future, as conditions have already been set for that individual. The person is what they are and nothing more. What was once filled with joy and possibility is now lying prostrate on a park bench in utter disgrace, in someone else's discarded clothing, with no one to love him/her and no one to love. Even the ax murderer once had parents and once had joy. And now it is the most awful thing to consider, as he sits in his inconceivably horrible jail cell. This notion is what makes the conclusion of the exceptional film "Philadelphia" and the unforgettable Neil Young composition "Rockin' In the Free World" so crushingly relevant. I shall try to sum up the dreariness of it all with a quote from the pen of Mr. Young:

"There's one more kid who will never go to school, never get to fall in love, never get to be cool." What powerful and hauntingly insightful words.

There is a parallel between the inevitable fall from grace and the earliest methods of making photographs. In the form of the calotype, the future of image-making by way of the power of light was infinitely wrought with possibility. To make the calotype, it was necessary for the creator to have an immense passion for the complex process. There was a simple set of criteria when it came to the judgment of the quality of an image, whereas in the present, the photograph, and that which makes one viewed to be better than another, has become a standardized aesthetic, complicated even more by hierarchies such as "what is good art as opposed to pop-art?" or "what is academic as opposed to unschooled?" The making of photographs has become increasingly married to academia and the need for several years of schooling in order to achieve the title of "photographer." All of this is the complete opposite of the raw sense of discovery felt by people like William Henry Fox Talbot in those "innocent" and undeveloped early days of photographic image making.

It was with all of this in mind that I decided to attempt to go back to the most rudimentary of processes. I may well conclude the experience with nothing but washed out negatives or maybe even blank pieces of iodized paper. But I wish to try to rejuvenate my photographic constitution and to experience the fruits of my toil in a way best summed up, I think, by the words of none other than Neil Young in a personal favorite song (obviously the live version) which is entitled "I Am a Child." "I am a child. I'll last a while. You can't conceive of the pleasure in my smile. You hold my hand, rough up my hair. It's lots of fun to have you there. God gave to you, now you give to me. I'd like to know what you learned. The sky is blue and so is the sea. What is the color when black is burned? What is the color?"

III: A Catalogue Of The Practice: "Deconstructing Construction"

What follows is an account of the thoughts that occurred to me as I went through the processes of building my camera and then utilizing it to make calotype images. It may seem highly technical in its composition, owing mostly to my mindset during its writing and also simply because of the nature of the project. I ask that, for the enhancement of the following, the reader keep the writing which preceded this account in mind. And so now, I humbly submit for your approval, my ruminations regarding this process.

My first consideration in the building of the camera was to decide which type I was to build and also which plans I was to work from. My choices were these:

1. The sliding box camera:[33] This type of camera was heavily used in the 1850's as a studio camera but was conceived of much earlier (devices of the kind were used during the Renaissance). The plans which I had access to, if used to build a camera, would produce one quite similar in design to the camera used by Niépce in the neighborhood of 1827 to create the first "automatic drawing." The sliding box camera design is quite bulky and therefore is intended to be set up and used in close proximity to a dark room. The camera consists of a body, a base, a lens with assorted stops, a negative holder and a focusing screen. The camera body is composed of three pieces – a fixed midsection, a front section and a back section. The front and back can move independently of one another and can each slide back and forth over the mid section, which acts as a light-proof shaft. Focusing is achieved by moving the front or the back sections of the body closer or further away from each other (by doing this the operator is moving the lens closer to or further away from the negative. For the wet paper process, the negative holder is usually designed to be used with the English standard negative sizes and therefore usually has an aspect ratio which is plus or minus 1.25:1.

2. The folding camera:[34] This type of camera originated in the 1840's and was primarily used as a kind of portable device because of its light weight and its ability to fold into a small rectangular surface when not in use. Since this piece of equipment is designed to be used on the fly, further away from a stationary dark room, it is practical to use dry, waxed paper negatives in conjunction with the camera (as prescribed by Sir John Fredrick William Herschel). The waxed paper negative originated in the early 1850's and therefore is younger than the wet paper process used initially by William Henry Fox Talbot. This camera is also composed of a box, a lens, a negative holder and a focusing screen. The folding camera (in the plans which I had access to) differs from the sliding box camera in a few ways. For one, it is smaller and produces a negative of a different aspect ratio. The holder which is to be utilized in conjunction with the folding camera is designed to be used with French standard negative sizes. Secondly, it is composed of a simple box (as opposed to the three part one described above) and is focused by sliding the lens closer to of further from the negative through a separate barrel.

I made the decision to go ahead with option number one, the sliding box camera, for a couple of reasons. One of those reasons is the fact that it is to be used for making images with the wet-paper process – the process created by William Henry Fox Talbot when he invented his calotype method. Second, I am partial to the English standard negative sizes. The sliding box camera is more difficult to build but caters to the most rudimentary process possible, which was one of my main considerations in making the decision.

I decided to use a plan which was created by a Mr. Alan Greene, who is a specialist in "alternative" processes and especially the calotype process. His plan provides a precise guide for constructing a sliding box camera with room for a holder with a dimension of 8" X 10" and is designed to be used in conjunction with a lens which is based upon a 58mm plano-convex style element with a focal length of 362mm. This allows for the usage of a 6.5" X 8.5" English "full plate"[35] negative without having to contend with the problem of a vignette. The lens element which I was able to obtain was slightly different from the one suggested by Mr. Greene and therefore a number of considerations had to be made so as to correct a few key dimensions in order to accommodate my lens. The element which I used was a 61mm of plano-convex style which had a

focal length of 345mm. I would later have to deter from the prescribed length between the "stop" and the glass to correct for the different size and focal length of my element. Also, in order to compensate for the phenomenon of chromatic aberration and other distortions, I needed to be sure that my element had an "angle of view"[36] which was plus or minus four degrees away from a perfect 45 degree angle which dictates a focal length of 329mm in order to cover the English full plate. Angle of view is the angle formed by the lens and the opposing corners of the negative format. Angle of view allows one to classify the lens as wide-angle, normal or narrow-angle (telephoto). My element had an angle of vision equal to 43 degrees. By dividing the diagonal of the English full plate (272mm) by the quotient for my 43 degree angle of view (.788) I arrived at a focal length of approximately 345mm – well over the minimum focal length needed to accommodate the format in question and also making it a very wide angle lens. The circle of illumination which my lens would produce at an f22 would be larger than the English full plate, and since the sliding box camera has no tilt functionality and a limited raising lens function, vignette problems could be ruled out.

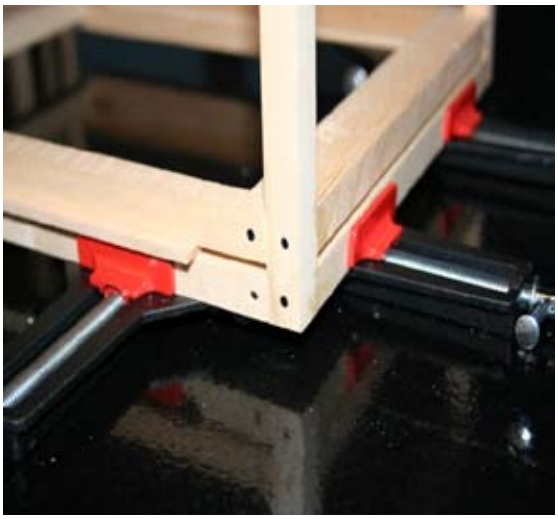
Since the entire camera body and the accompanying base are made of wood, the first step was to obtain the prescribed lengths and types of wood necessary for the realization of the sliding box camera. Some of the lengths of wood that would be needed were unobtainable at any of the local hobby stores and, because of this misfortune, I had to cut down some wood of larger dimensions so as to achieve those which were necessary. This was a long and tedious process which had to be done in short stints because as the arm became tired, the cuts became much less precise. Precision in all things relating to the construction of the camera was of paramount concern. It should be noted that the entire framework of the camera is composed of basswood, which is commonly used for frame stock. The reasoning behind this is the fact that the early calotype making process is a wet-paper one and thus the wood which composes the camera must have the attributes necessary so as to avoid warping with repeated exposure to moisture. The outer walls of the camera are made of 1/8" luan sheets, which are used solely for the purpose of maintaining a light-proof enclosure and have less to do with the properties of the wet-paper process.

The first part of the actual construction of the camera was the building of the negative holder and the focusing screen, which are nearly identical objects. They are composed entirely of basswood (with the exception of the dark slides) and actually, in a way, resemble 8"X10" picture frames. Just as in modern day large format cameras, the camera uses a separate part – the negative holder – as a kind of magazine in which the unexposed wet paper (or in the case of the modern day camera, the film) is held. The holder (with negatives and dark slides in place) is inserted into the rear of the camera via a slot and then the dark slide is removed before making an exposure. After the exposure is made, the dark slide is replaced, thus protecting the exposed negative, and the holder can be taken to a dark room so as to move on to the development phase of the process.

The focusing screen which will be used for the sliding box camera is similar to ones used in modern-day large format cameras with a few critical differences. The main difference is that, on

most of today's large format cameras, the focusing screen is a part of the camera body – fixed in place for the entire photo-making process. With this particular sliding box camera (and the ones which Talbot and other calotypists used) the focusing screen is a removable part just like the negative holder. The camera operator inserts the focusing screen into the slot in the top of the camera (the same slot which is used for the insertion of the negative holder) and then the ground glass is used to frame and focus upon the subject which is intended to be photographed. At this point, the focusing screen is removed from the camera and replaced by the unexposed negatives. Another key difference between the modern day view camera and the sliding box camera is, in place of a fogged piece of ground glass for a focusing screen, a piece of translucent paper (somewhat like wax paper) is sandwiched between two pieces of 8" x 10" sheets of glass. The translucent paper functions in the same way as the modern day ground glass, producing an inverted view of the subject.

Only the framework of the holders could be constructed and then the completion of them had to be put on hold as the camera body needed to be first completed so as to ensure a proper fitment. So it was on to the construction of the back and front sections of the camera. The first steps were composed of the creation of the basswood frameworks which would serve as the structures of the sliding front and rear. The frameworks were composed mostly of ½" X ½" lengths of wood with a few ½" X 1" sections for added stability and proper alignment of the negative holders which would eventually be inserted. One ¼" X ½" was inserted into the forward section framework so as to facilitate the proper movement of the sliding front which will be explained later. Joints were secured first with a quick setting wood glue and then with 1" finishing nails.



As the front and back frameworks needed time to set, the construction of the lens could begin. I've already written extensively about the lens element which I was able to obtain and the various complications which arose from its difference in size from the one utilized in Mr. Green's plans. Because of this, I will write exclusively about construction as opposed to reiterating figures which have already been discussed.

The first step in constructing the lens was to determine the figures which differed from Mr. Green's 58mm lens in light of my 61mm lens, which obviously had a different focal length. The main differences in construction would be the distance of the lens from the stop and also the size of the hole which constituted the stop in order to achieve an f22 which I had chosen as the only stop which I would construct. I made this decision so

as to narrow the variables in the calotype making process. Since my aperture size would be limited to a fixed f22, the only figure which I would have to be concerned with would be exposure timing. An f22 as opposed to an f16, f32 or f64 seemed appropriate to achieving the flattest image and highest definition while also allowing for a reasonably generous depth of field. To determine the size of the hole needed to achieve the equivalent of an f22 in conjunction with my element, I observed that a 15mm hole was used for a lens with a focal length of 329mm to achieve an f22. I simply chose a 17mm hole via a guess, since my lens had a longer focal length.

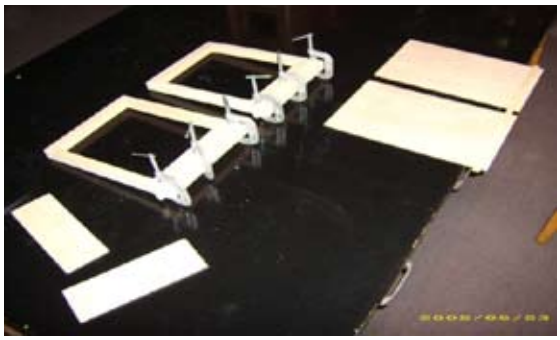
The lens barrel was composed of a 3" length of matte black painted PVC and the stop a 1" length of the same. The stop was made with heavy black construction paper and reinforced with 1/16" black foam core. This assembly was then held in place with a circle of ½" foam core. The lens element itself was held inside a slightly smaller than 61mm circle of ½" foam core and then slid in place, sandwiched between two more ½" foam core circles at the back of the 3" lens barrel. The lens was completed by affixing the stop to the front of the 3" section and then by

to the side pieces and then the luan siding was glued and nailed upon the framework to form the walls of the camera. The base section, which connects to the tripod and serves as the surface which the camera slides upon, was constructed using a 2' section of luan and also a 2' length of pine. One bushing was sunk and glued in place in the bottom of the pine for tripod attachment and then basswood was glued and nailed around the perimeter of the luan sheet forming a boarder for the camera to slide upon.

Once the basswood framework of the front and rear sections of the camera were set and ready to revisit, it was time to line them with the 1/8" luan sheeting. Various dimensions were cut using a table saw and then attached to the basswood framework with quick setting wood glue and half-inch wire nails. The luan formed the walls of what would eventually become the camera.

After the front and rear had top, bottom and side luan-walls, the front needed to be further worked upon so as to allow for a "sliding front" and the lens board holder. The front wall of the camera was composed of a luan sheet with a 5" X 5" square cut into its center and this board slid into the top of the basswood framework via a 1/8" slot. Both the slot and the luan board had to be sanded to ensure a snug but movable fit. A ½" X ¼" basswood spar was connected both to the inner basswood framework and also the back of the basswood front wall. This formed a light-tight stopping point which facilitated the ability of the lens to slide up or down within a one inch margin. Finally, two lengths of basswood were attached to the inner and outer side of the bottom of the cutout on the front wall and three lengths were attached to the inside of the other three edges of the square. A ¼" margin was created between the outer edge of the cutout square and the inner basswood spars so as to create a light sealed indentation for the accommodation of the lens. Four 1" X ½" basswood pieces were

mounted to the outside of the front wall via 1" aluminum screw posts which were able to move up or down to hold the lens board in its place. The sliding front section was completed and ready for the mounting of the lens. This "sliding" function allows for a bit of control over the perspective of the image composition. A modern day view camera usually has tilting and sliding functions which serve as tools for the changing of the point of focus and also the alteration of some of the properties of linear perspective. Although my camera has only a very rudimentary version of this, it at least allows for a bit of creative control for the operator.



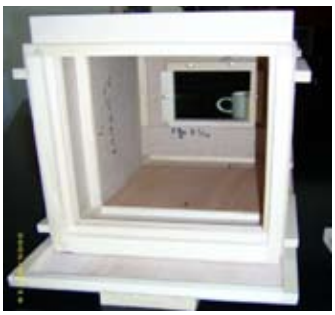
The next step was to fit the focusing screen/ negative holders to the slot in the rear section of the camera. A 1/16" margin of error between the edges of the slot was acceptable but I quickly found that my holders were significantly thicker (maybe around 1/6") than the slot which they needed to easily move into and out of. A very tedious and tiring sanding was in order for each of the holders and the channel which composed their slot in the rear section of the camera. Two days were devoted entirely to sanding these components. Finally, a snug but operative fit was achieved and each holder could be set in place in the back of the camera. I finished the holders by installing a row of ¼" basswood around the top end of each one and then cut a ¼" X 24" section of basswood into two 8" sections which would act as light traps, being inserted after the glass with the wet negatives had been placed in the holder. So I had a complete rear section and a complete front section. The next step was to create the midsection which joins the two.

Four pieces of luan were to compose the walls of the midsection. Two 8" X 8-1/4" and two 8-1/4 X 10-3/16" were used for this purpose. Each piece's perimeter was lined with basswood lengths. The two side walls were inserted between



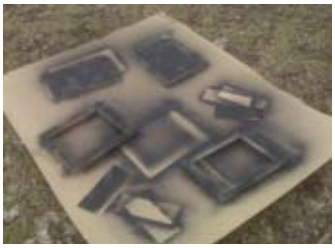


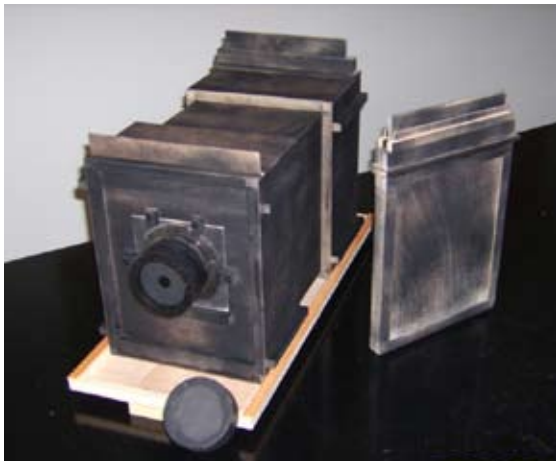


the front and back sections of the camera and then the top and bottom pieces followed suit. This created a surprisingly strong shaft which the front and back could slide back and forth upon with no gluing required. Black silicone caulk was used to line the inside edges of the midsection to guard against light leaks. After the installation of the midsection, the camera became a single object. The front and back were now inseparable.

At this point, a bit of sanding of the runners of the camera and the basswood sides of the base was required so the camera could slide easily back and forth for the purpose of focusing. Two polyurethane-coated yard sticks with millimeter markings were affixed to the sides of the base and finally, the entire structure of the camera was complete. The final step was to paint all visible





surfaces with a matte black spray. The camera was disassembled and painted in many very light coatings so as to avoid obstruction of the moving parts. The camera was finally fully completed and ready for use. The structure itself was strikingly beautiful in a sculptural sense. The completion of the camera alone was enough of a rewarding experience to satisfy me completely; however, the second half of the project, the task of actually making exposures, was only just ready to begin.

When preparing to ready paper negatives for use, one must carry out a number of prescribed steps to prepare the paper for the sensitization and eventual exposure. The first step is to acquire the right kind of paper for the job. In a sense, any paper would do (even legal pad paper or scrap writing paper); however, there are a number of considerations to be made before selecting the kind to be used. One consideration is the paper's "wet strength." Since my calotype making process belongs to the wet-paper order, the strength of the paper after exposure to moisture is of great concern. A weak paper is likely to tear or disintegrate in the various chemical solutions before even being exposed. The weight of the paper, the material of which it is composed, and the amount of starch sizing used during creation, are all factors which affect the wet strength of the paper. Common papers[37] which are used are graphic designer's marker papers, architectural drafting vellums and finally, office stationary. Each type of paper has pros and cons and, weighing these, I decided to go with the office stationary for my negatives and prints. Office stationary is relatively cheap, has a highly favorable wet strength and also has a great amount of starch sizing already present,

which alleviates the camera operator of the task of self paper sizing. Some drawbacks are the high number of brands which watermark their paper and the tendency of office stationary to contain pinholes which allow for the leakage of sensitizing solution during flotation, which results in a negative which is stained and sometimes unacceptable for use. I solved these problems by obtaining a 24lb paper composed of 100% cotton with zero watermarking. The cotton composition virtually eliminates the presence of pinholes and is a very strong wet base.

Before moving on to the steps involved in making photographs using the calotype method I must say that I used a process which was initially conceived of by A. Guillot-Saguez.[38] His method improved upon Talbot's original process in a number of ways which ultimately allowed for faster exposure, wider tonal range, and more reliable results. The basis for the entire process is the method initially conceived of by William Henry Fox Talbot.

The first step in creating the negative is the iodization process, [39] which was discovered by William Henry Fox Talbot by accident in the early 1840's. Iodization is a departure from the direct-to-positive process and is what made the calotype quite unique in its time. It creates a latent image which is later revealed by development in a gallic acid solution.

At this point I must say that, because of the absolutely volatile nature of nearly every chemical and chemical compound used in the calotype making process, an organically filtered respirator must be used AT ALL TIMES and nitrile gloves must be worn AT ALL TIMES. Any chemical dealings must be carried out in a dark room which has adequate ventilation. A darkroom without means for ventilation is not usable. This being said, I carry on with the description of my progression:

The iodization process can be carried out in daylight, as potassium Iodide is not light sensitive. Each sheet of paper must be iodized before sensitization. The stock iodization solution is composed of 500ml of 68f degree distilled water (all water mentioned from this point on should be assumed to be distilled) and 20 grams of potassium iodide. For my purposes, which included the iodization of thirty cotton sheets (which are relatively heavy in weight), I mixed up a 2.25 liter solution of distilled water and added 70 grams of filtered potassium iodide. To iodize the paper, I held each sheet of paper by two adjacent corners and submerged it gradually in order to avoid the creation of air pockets under the paper surface. I was able to submerge six sheets at a time. Each sheet is submerged, turned over twice and then left to set. The standard soaking time for six sheets is five minutes; however, given the weight of the paper which I used, I soaked for approximately seven minutes. After the soaking time has elapsed, all of the papers are turned over and submerged again before lifting the first sheet out of the solution and hanging it to dry on a clothes line with a clothes pin. After one sheet of paper is removed from the solution, a duration of thirty to sixty seconds should elapse before removing the next. This is to ensure a uniform soaking time among all sheets. Finally, when all sheets are soaked and hung, a small square of plain paper is stuck the bottom corner of each sheet to collect excess chemicals which would otherwise amass to form an undesirable stain on the eventual negative.

I completed this process over a period of a number of hours and then left the sheets to hang and dry. The paper dried relatively quickly (over a period of about two hours) and at that point I removed each sheet from the clothesline and stacked them. I placed the sheets between two large and heavy books and then set two one gallon jugs of distilled water on the top book for added pressure. During the night the paper was completely flattened and the iodization process was complete. The paper had turned a very slight sepia tone with the very edges turning a darker brown. This was to disappear upon sensitization and exposure. The texture of the paper was obviously different and I was confident that my iodization process had been successful.

Because of the extremely dangerous nature of the chemicals involved in the making of calotype photographs, I reasoned that it would not be practical to use the Kalamazoo College photographic facilities. I instead opted to construct a makeshift darkroom in an unused room in the back of my house. I first opened one window for ventilation and then proceeded to cover the two windows in the room with heavyweight black construction paper. I left my clothesline in place for drying prints and negatives and installed a safelight in the fixture on the ceiling. On the outer entrance to the vestibule which precedes the entrance to the room itself, I hung a large blanket so as to create a light tight area in which I could safely enter and exit the darkroom without exposing my silver nitrate solution. I achieved a perfectly black darkroom in under a single day's work.

To prepare for the sensitization[40] of the iodized paper negatives, I cut 15 of the thirty sheets down to the 6.5 X 8.5 English full-plate size. The other fifteen sheets were left at the dimension of 8 X 10 to aid in the developing-out process (the reasoning behind this will be explained later). Sensitization of iodized paper negatives is a long and somewhat difficult process which requires patience and a great amount of care in order for success to be achieved. The procedure begins with the mixing of the sensitizing solution. There are a number of sensitizing formulas which can be used; however I picked one which caters to the lens which I built and the photographic properties which go along with it. The stock solution was composed 275ml of 68f degree distilled water, 22 grams of silver nitrate and 44ml of glacial acetic acid. The acidity of this solution provides for a wide range of gray values and preserves a very pristine white value for the paper which it is used in conjunction with. The downside of the acidity is its tendency to increase exposure times drastically. However, a bit of play is acceptable in an operator's personal solution. Increasing the amount of acetic acid lengthens the exposure time and decreases contrast while decreasing it shortens exposure time. The acid level can be cut in half to decrease exposure time by about half. However, the less acid involved, the higher the resulting contrast; therefore this is something to consider when creating one's sensitizing solution.

Paper is not to be fully immersed in the chemical mixture; it is, rather, to be floated on one side, thus only sensitizing that face of the negative. This is because of the fact that, when the backside of an iodized sheet comes into contact with the sensitizing solution, it tends to stain the eventual negative in the form of dark gray blotches. Great care needs to be taken when floating the paper as it can easily fall into submersion.

So, I began my first attempt at making a calotype negative. I had my iodized paper in hand, had already taken the liberty of using the camera and focusing screen to compose a reasonable test shot and was ready to sensitize. I mixed a stock sensitizing solution and also I preemptively mixed stock solutions of developer and fixer. Developer is composed of a 1.6g gallic acid/275ml water solution and fixer is made with about 450ml of water and a little over 50g of sodium thiosulfate (hypo). I held a single sheet of 6.5 X 8.5 pre-iodized paper by two opposing edges and gently eased it into my silver nitrate/acetic acid/water solution. Some curling of the paper developed immediately after immersion however this was easily controlled and the paper settled down nicely. Reasoning that I was using a fairly heavy paper (24lb office stationary), I sensitized for ten minutes. After lifting the paper and replacing it in the solution a few times to eliminate any air pockets resting under the sheet, I took the sheet and placed it face up on a piece of 8 X 10 glass which had been topped by a single sheet of rubylith film. I then set another 8 X 10 sheet of glass on top of the sensitized sheet, thus sandwiching it and readying it for placement in the holder. Taking the glass assembly, I inserted it into the center slot of the negative holder and then placed the two dark slides in the outer slots. I finished this process by inserting the light trapping top in the center slot. Keeping this assembly upright, I emerged from the darkroom and headed to the camera setup.

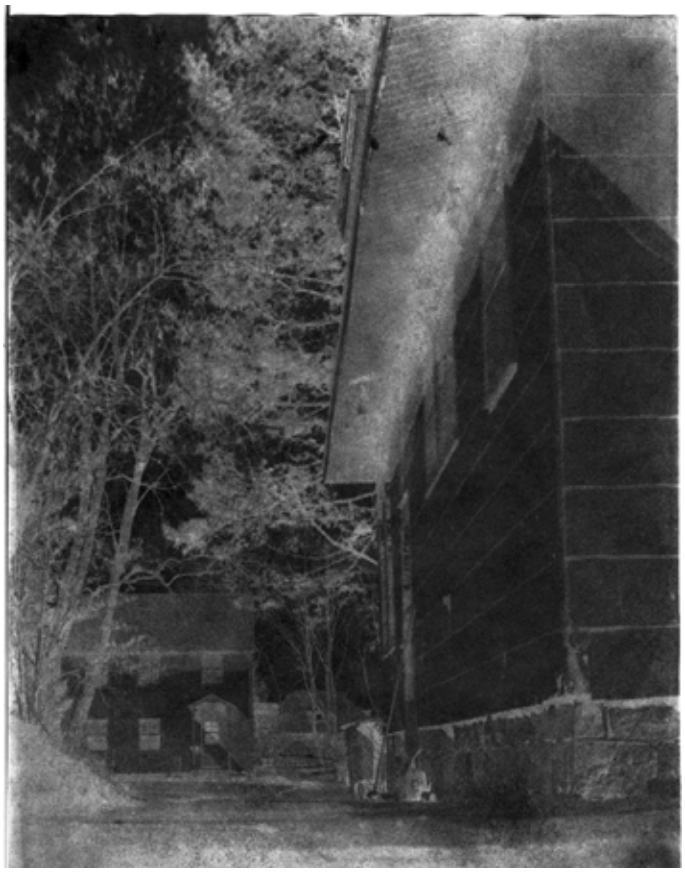
I immediately slid the negative holder into the top slot in the rear section of the camera, removed the dark slide and, finally, lifted off the lens cap. Given the weather conditions, which were quite gloomy (I would estimate in the EV 18 range), I decided on an exposure time of exactly forty minutes. While the exposing was under way, I took the liberty of placing a washing bath in the dark room and also mixing up a sensitizing-replenisher solution which contains the same amount of acetic

acid by a much higher amount of silver nitrate (60g to 275ml of water). When exposure was complete, I replaced lens cap and the dark slide, removed the negative holder and returned to the darkroom. I disassembled the holder and gently pried apart the two pieces of glass. Taking the paper by two opposing corners, wet side down, I slowly placed it into the gallic acid based development bath. I watched with great amazement as the developer surrounding the paper immediately turned black. I interpreted this as the process of the gallic acid removing the unexposed nitrates. According to my sources, after about 2 minutes, a semblance of an image should be visible. I lifted the paper, and to my amazement and horror, the paper had turned completely black. What was the problem? So many variables. A psychological overload. I briefly fixed the black paper and washed it and then examined it in incandescent light. Truly, the paper had become completely black. Was it grossly overexposed? Had I over sensitized? Was the developer too strong? Does a calotype holding a latent image begin by turning to an extreme black and then to the eventual production of a viable negative? All of these thoughts passed through my mind. What an utterly disheartening moment. Actually it was a series of moments as, over the next few days, I toiled in the darkroom over unsuccessful exposures which produced the same result – absolute blackness. I went through every possible flaw in my process. Was the sensitizing solution too powerful? No. There is no such thing as a sensitizing solution which is too powerful – if there were, exposure time would be much faster (this was my reasoning, you see). Was the developer too powerful? I tested that theory by adding a bit of acetic acid to it which did absolutely nothing to aid the situation. Could it be my iodizing process? Were the papers too iodized? Is that even possible? I didn't know. Finally I searched various online forums and found one in which a person had experienced an a phenomenon very similar to mine. The culprit: paper. The paper that the person was using had some kind of acidic impurity which reacted negatively with the chemicals. As soon as the paper was switched to a 100% cotton one, everything worked as it should. My quandary was this – I was already using a 100% cotton paper. Nevertheless, I reasoned that there must have been some kind of impurity in that paper, so I purchased a different brand. Same result. How awful. I tried sensitizing an unexposed iodized paper and developing it. Blackness. I tried sensitizing an unexposed uniodized sheet of paper. No reaction – no blackness. This result lead me to believe that something was wrong with my iodization process, but there were too many variables to be sure. I re-iodized some sheets and tried again. Blackness. I was ready to give up. How had Talbot managed to invent the process if conditions needed to be as exact as this? In a fit, I poured a generous amount of acetic acid into my sensitizing solution, which already contained a sheet of paper. I suppose it was an attempt at fully disintegrating the paper as an act of rage. I threw the page in the developer for kicks. Surprisingly, there was not an immediate flooding of blackness into the development solution. I lifted the paper and to my amazement, I was looking upon this:

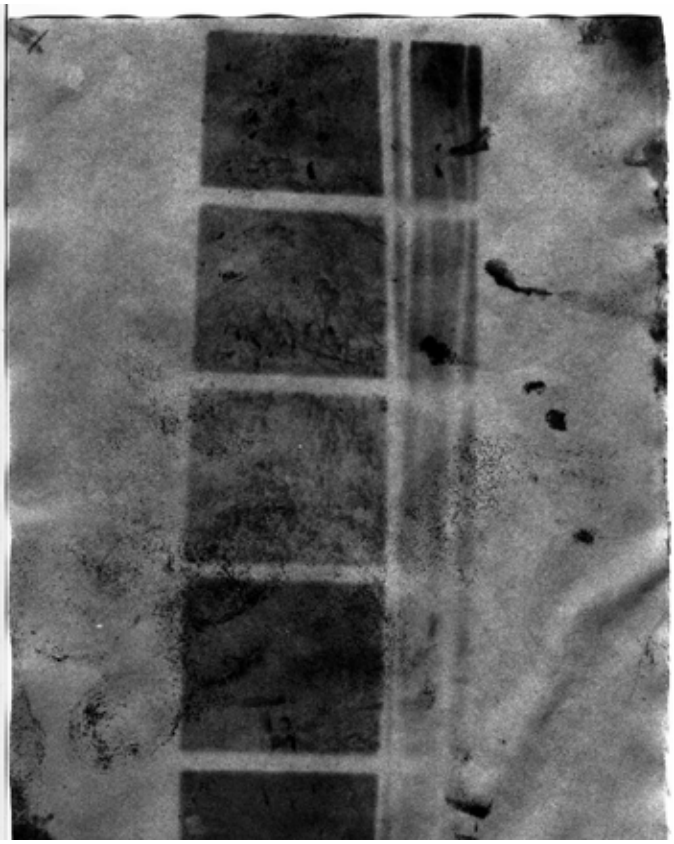
A semblance of an image. It had been my sensitizing solution. I had mismeasured, and had added too little acetic acid. I had discovered the key. I mixed a new sensitizing solution with the correct amount of acid and was finally able to achieve somewhat reliable results. In those few days I gained a newfound sense of intimate respect for William Henry Fox Talbot and his contemporaries, a kind of respect which can

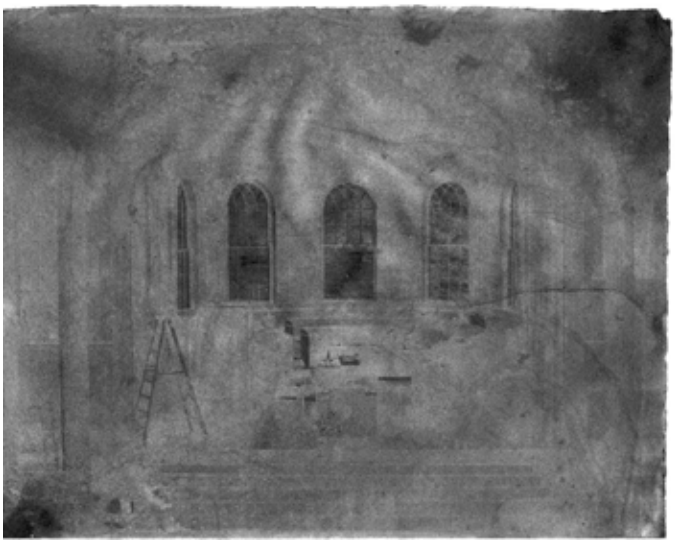
only be shared among practitioners of the same vocation. Happy accidents. The driving force behind all of these inventions and the driving force behind the realization of my endeavors as well. Amazing.

In subsequent days I became more and more confident with the medium and gained an "eye" for environmental conditions (for judging calotype exposure times at f22). My negatives displayed heightened cleanliness and a wider range of gray tones. One early exposure was this:



With each new day came a slightly different mixture of chemicals and with it, a new set of problems to overcome. Although the difficulties and the unpredictable nature of the process rendered some of my negatives as somewhat unintelligible, nearly every negative, regardless of how well realized it was with respect to technical perfection, was quite interesting. Sometimes the appeal of the images created by this process (as well as others) is the imperfection, mysteriousness, and indeed, unintelligibility. To illustrate this point, I shall now present some of my early negatives which might fall into the category of the "technically imperfect:"





With time, I began to understand the subtleties of the sensitizing/exposure/development/fixing process and gained the ability to produce negatives which shared a more "perfect" consistency. I settled on a development process which was actually quite different from the one which I had learned of in my book of reference. It became a process absolutely unique to me and was tailored to my operation's preceding development. Development time went from nearly twenty minutes to less than two. Acetic acid was added to the my gallic acid-based development solution so as to allow me to lift the paper and actually watch the negative develop over a very short but controlled period of time.

After gaining some confidence in my ability to work the process, I began to venture further away from my darkroom to obtain exposures. Some of these trips ended in utter disappointment while others produced amazement. On the final day in which I exposed for this project, I made some eight different negatives. In making the last four, I realized that my holder had begun to suffer from heavy use and was in need of mending. Because of this, and the fact that I felt that I had produced a sufficient amount of images, I decided to conclude the field work involved in the project.

Before "developing-out"[41] can occur (making positives), there is a final step in preparing the negatives for use. This involves waxing them to increase their transparency and durability. Natural beeswax is used for this purpose. The wax is heated in a glass tray in the oven until it is liquefied, and then sheets of stationary are briefly submerged and subsequently hanged to dry. Taking four of the dried waxed pieces of stationary, negatives are to be sandwiched between stacks of two sheets. An iron set to a

very low temperature is then passed over the top sheet, heating the wax and gradually and evenly transferring it to the negative. After this process has been carried out for each image, developing-out can take place.

Developing-out is a somewhat counter-intuitive process, since it involves a completely different set of chemicals and does not involve the creation of a latent image which later must be revealed. The essence of an image appears gradually during exposure to sunlight. Silver nitrate is still the principle reactor in the process; however this is a dry method as opposed to the wet-paper process used in negative creation. One would think that contact printing could be achieved via the same process with the same chemicals and, indeed, that would be a correct assumption; however, that process would be called "printing-out," and produces debatably inferior results to those achieved by developing-out.

For the reader, I suppose, the chemical solutions and the intricacies are not what is important here, but it is instead the physical acts involved in the process which ought to be noted. I shall proceed with this reality in mind.

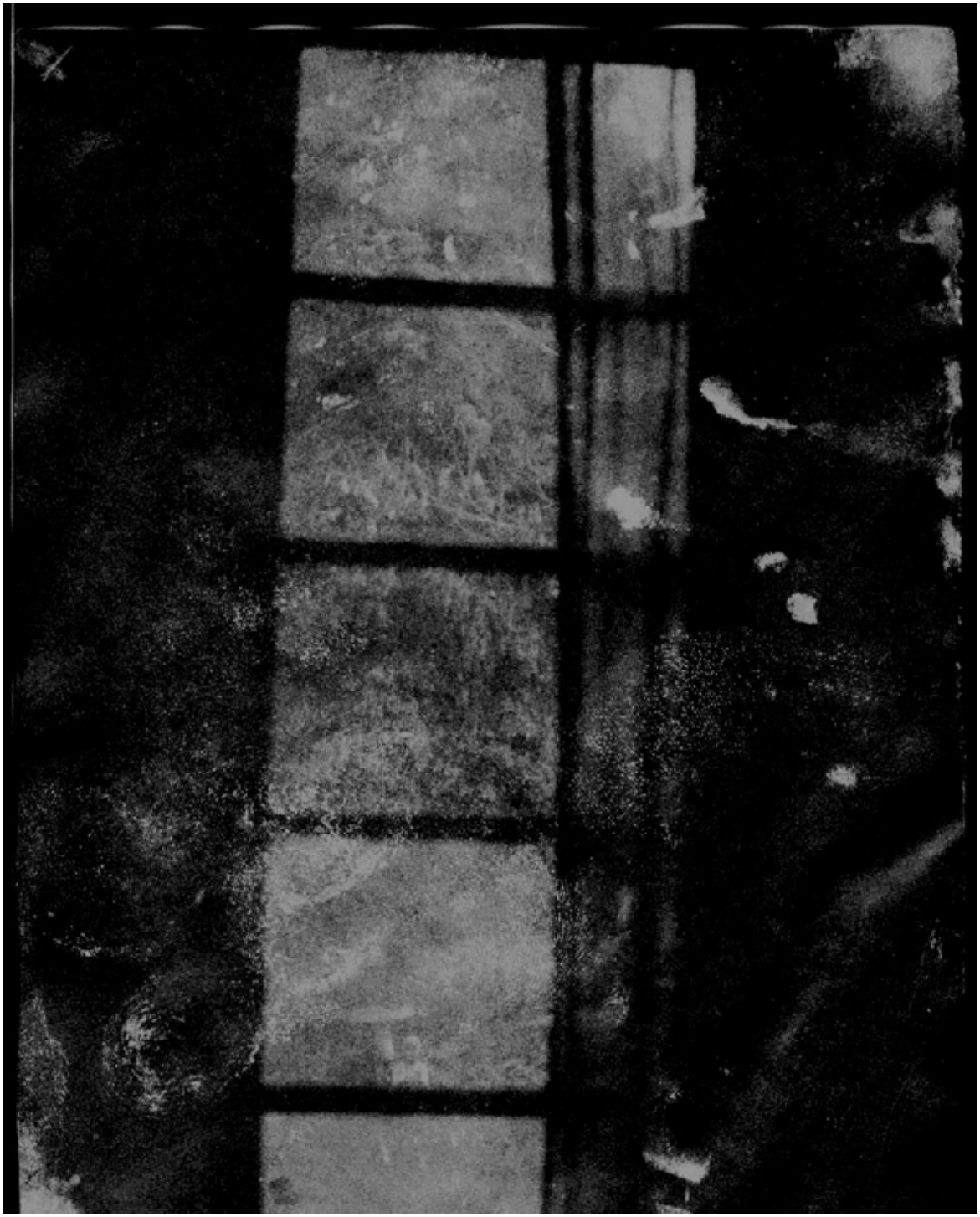
First, a future positive print must be salted. This is somewhat like the iodization process but uses different chemistry. The idea behind salting is to provide a kind of base upon which to place the silver nitrate. Variations in chemistry produce variations in development quality in the form of differences in contrast, tonal range, definition, color and density. After salting is complete, just as in iodization, the paper is pinned-up to dry.

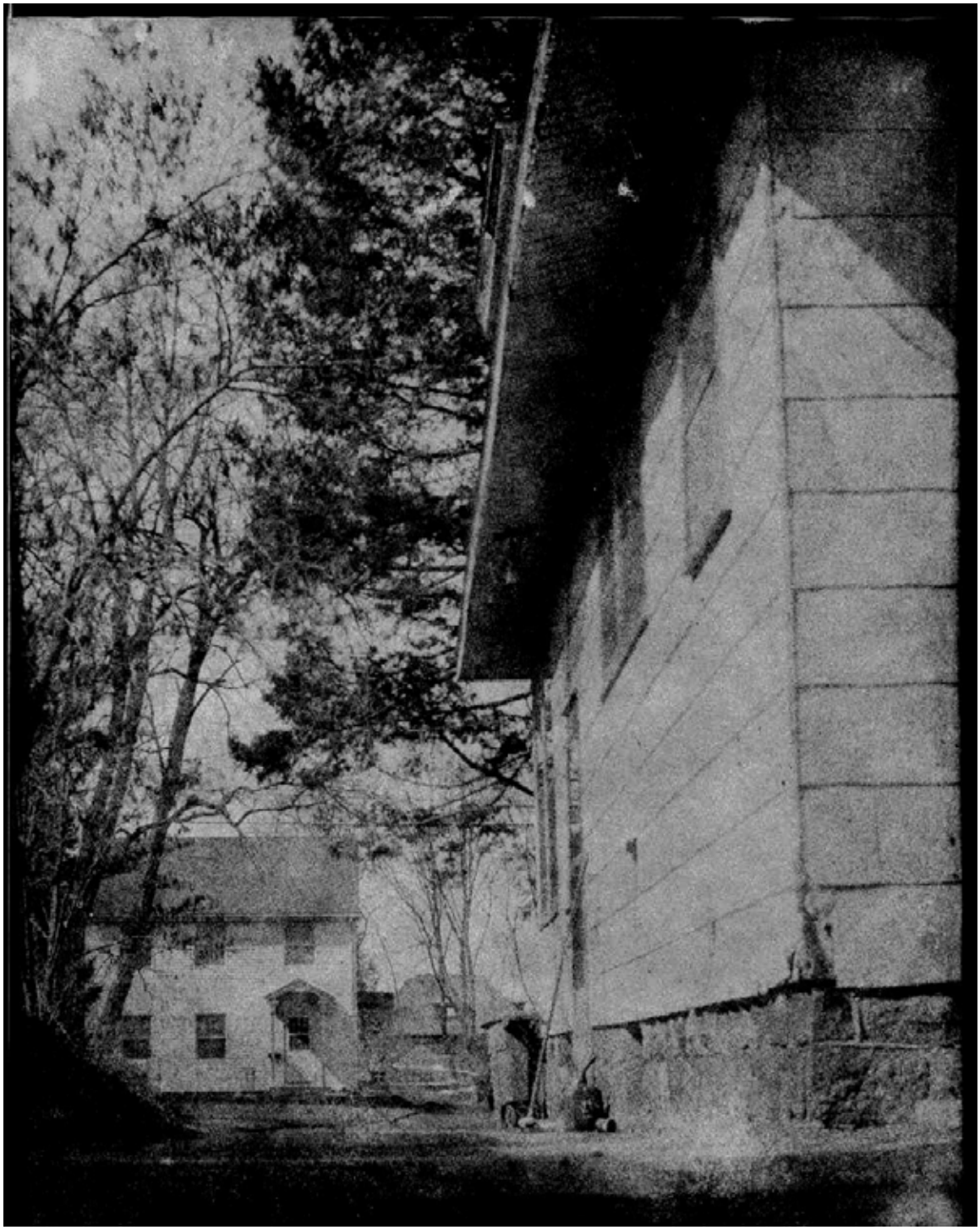
Once dry, the paper is to be sensitized in a strong silver solution with the addition of citric acid to achieve a "warmer" image. Sensitization is very similar to the process involved in sensitizing a negative; however, after a sheet has been floated, it is hanged to dry because, as mentioned above, this is a dry process and is different in nature to the wet-paper exposing method.

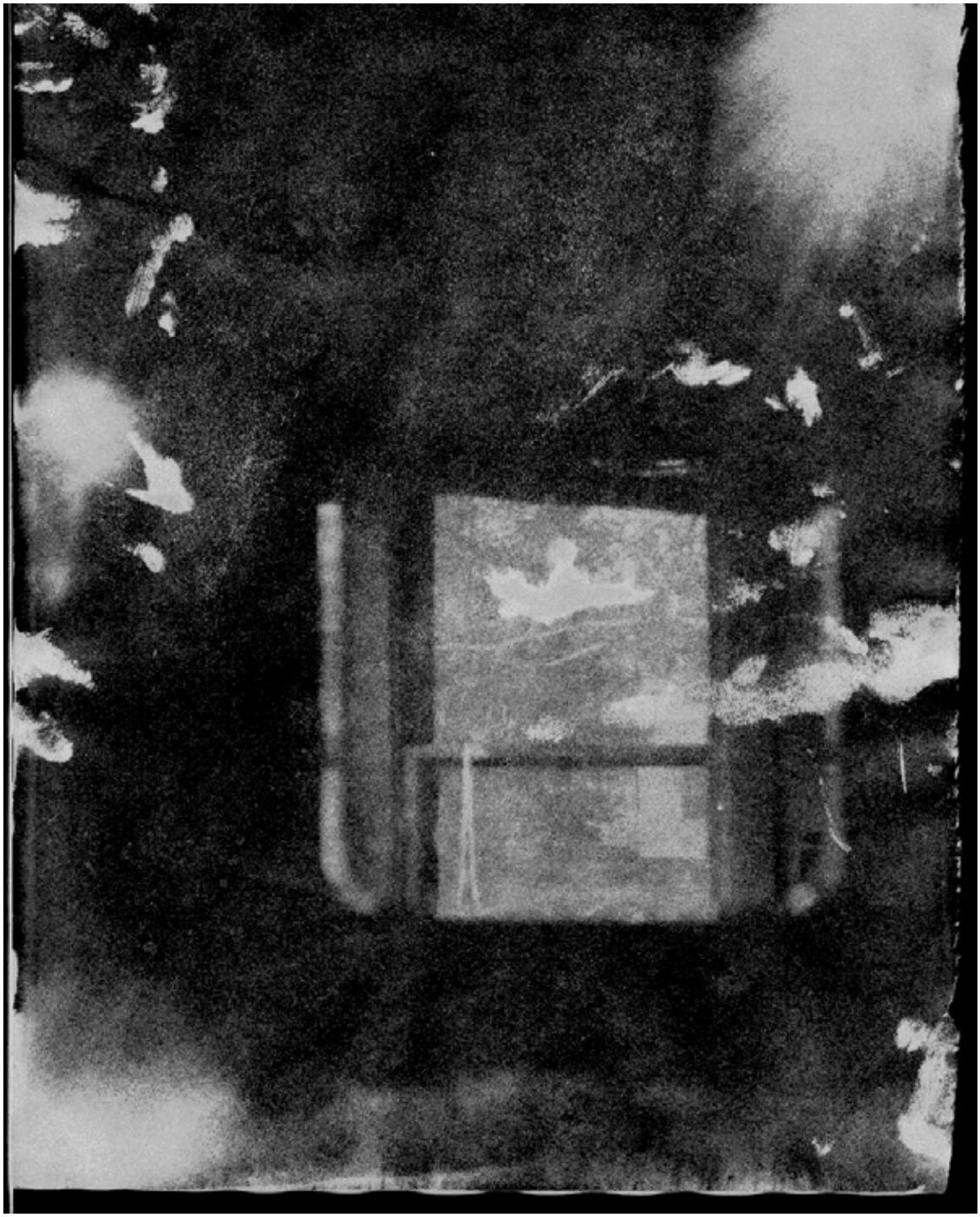
After the papers have been salted, sensitized and dried, they are ready for exposure. Using a split-backed contact printing frame or an improvised belted holding mechanism, [42] one places first the negative, facing away from the eventual sunlight, and then follows this with a sheet of paper ready for developing-out. Taking the frame into the sunlight for exposure, one must consider the lighting conditions in order to determine timing as well as the simple viability of a given day for developing-out, as some environmental circumstances are not conducive to the production of good prints.

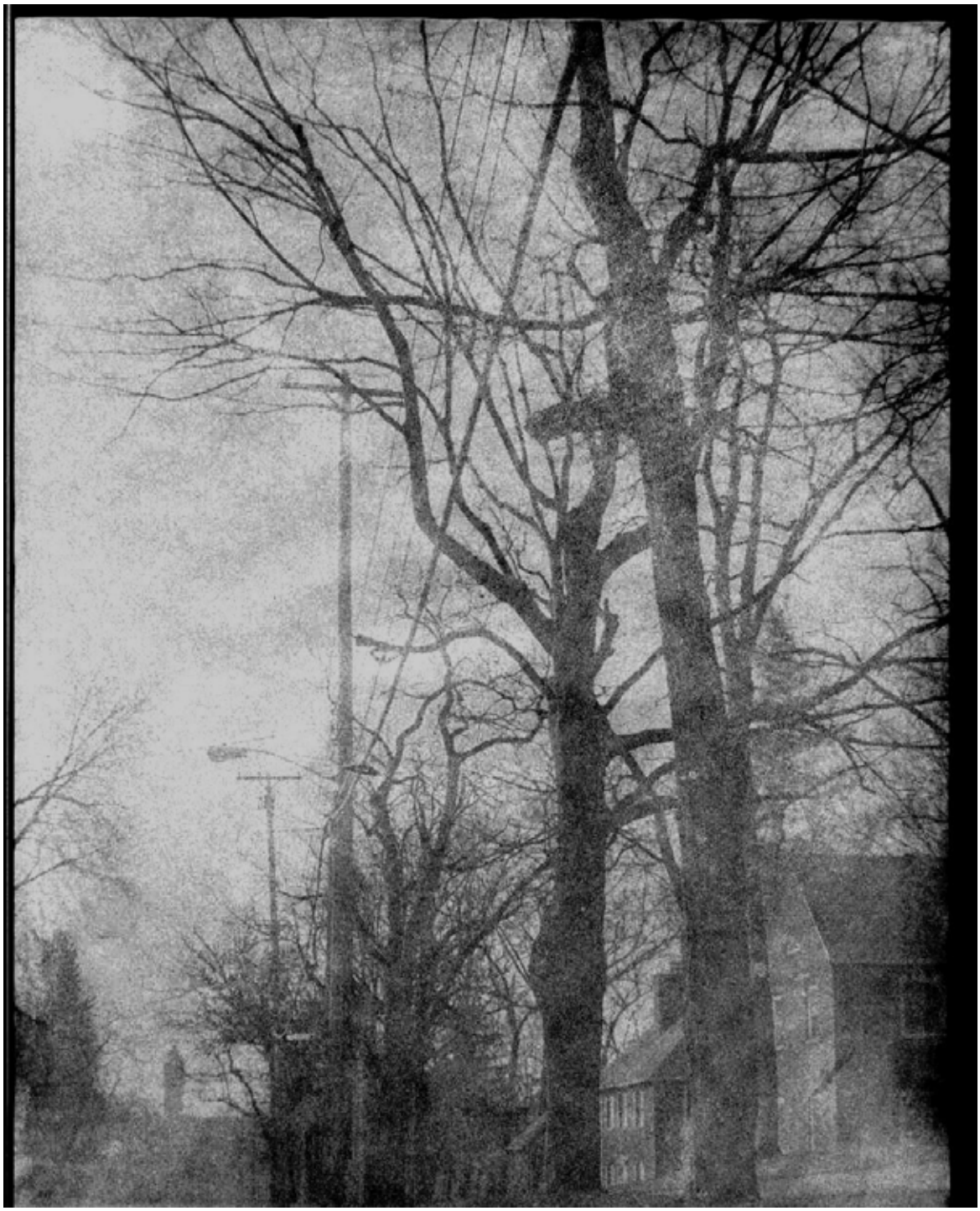
Using the developing-out process, exposure can range from less than five to more than twenty minutes. Readiness of the exposure for development is determined by the eye of the developer. Using the outer edges of the salted paper as a guide for progress, it is advisable to allow the print to turn from a light pinkish hue to a light purple, the latter indicating the end of exposure time. This is not the only method of determining the readiness of the print. The frame can be brought back to the dark room and, using the split back, the image can be examined under safe-light conditions. A finished print will display the beginnings of dark and mid-tone portions of the image with the highlights left unrendered. When this state is achieved, development can occur.

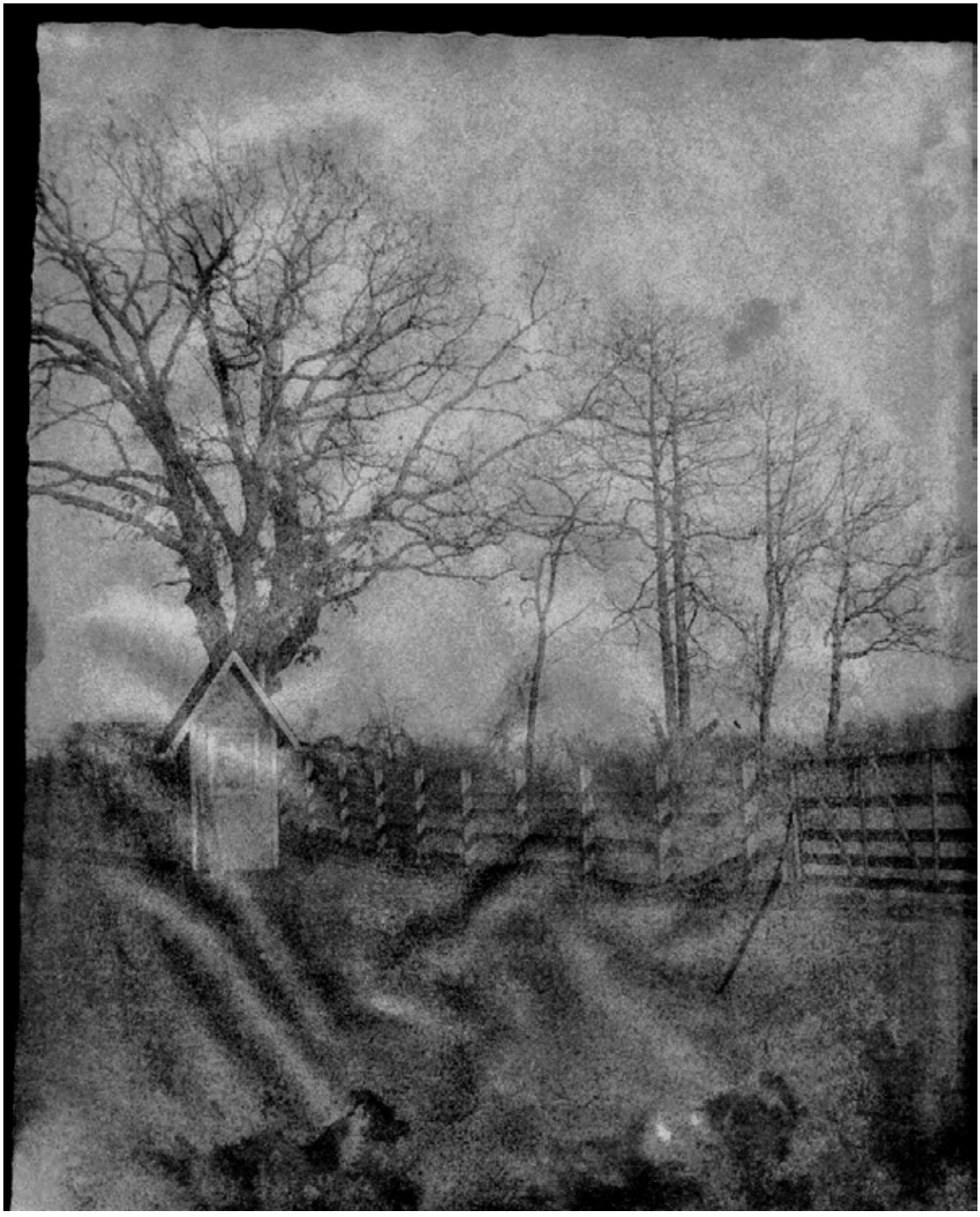
Developing is highly similar to its wet-paper counterpart; however, a great deal of aesthetic control can be exercised by the amount of time that the paper is left in the chemical solution. One can control contrast, density and tonal richness by developing for more or less time. This is a process which is intuitive and cannot be described in a step-by-step fashion. After sufficient development, fixing must be performed, and then a simple washing with running water finishes out the process. Prints are to be dried on a screen. Once dry, the prints can finally be looked upon in their completed manifestation.

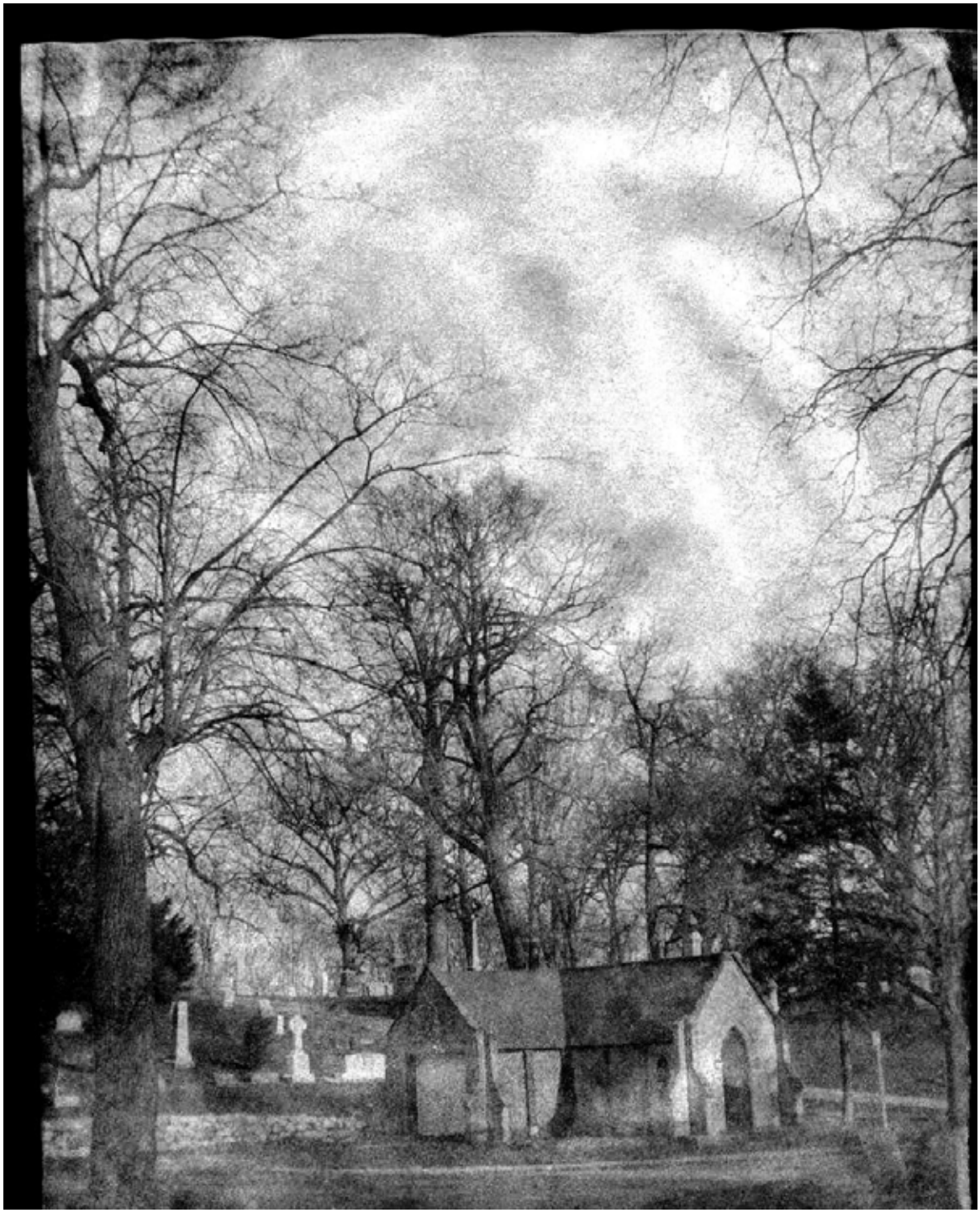












IV: Afterword: "The Negative/Positive Process"

A few days ago, I emerged from the dark room, appeared in the living room where my mother sat, and exclaimed, "I think this project saved my life." I've said those kinds of things before only to, later on, begin to prove those words wrong. Yes, I've spoken too soon. And in fact, when I first conceived of the idea of writing a manifesto, building an inconceivably advanced camera and making photographs using a method which was long ago forgotten by most, I was in the depths of the latest of a long series of "rock bottoms." I had just returned from Botswana, humiliated, and with almost no ability to remember any detail from my previous two months there. I felt and looked like death and had been institutionalized because I could no longer financially support the occupation of killing myself.

When I think about it, the one driving force behind my survival and my ability to continually pick myself up (with the aid of the few people who, for some reason, still cared for me) was the idea that one day, I might graduate from college. For many, this is a customary and even expected notion. For many more this is an unobtainable or even an undesirable notion. I don't know why I have cared so passionately about the idea of graduation from college for so long. I've always hated school. I still do. I hate being taught, although I do like to learn. I don't like waking up in the morning; I don't like writing "papers" or doing any other work, for that matter, and I hate being held accountable for anything. It seems that college would, because of these things, be a hell for me (which is not absolutely untrue). Graduation, though, was something that I always expected would happen and was part of the grand scheme of things in my life-vision. I had cultured, starving-artist parents and naturally, I too was to become cultured (and a starving artist). However, the closer I came the end of my undergraduate education, the more unattainable it seemed to be. Graduation from college became the figurative swinging carrot in front of my figurative horse's face.

It was in the institution that I came up with the idea for all of these things on which I now reflect. After cleaning up once more and being given a last chance once more, I found myself at the beginning of what became the substance of this project. I didn't want to do any work. I felt "bad." But for some reason, I made myself go to my father's office each day. I made myself study this process. I made myself create every edge of this camera from a pile of sticks. I made myself build a dark room and I made myself make photographs. It wasn't until the later stages of the project that I realized I wasn't making myself "do" anymore. I "did" because all of this meant something to me. I suppose that for the last eleven weeks the project became my life, and I nursed it to health and completion with every drop of glue, every pounded nail, every grain of silver.

All of this sounds awfully trite and melodramatic when I read it to myself but there is a good deal of truth in these words which I write. I've humbled myself enough times to know that it is very possible that I will "humble" myself again. But for this last term I have lived the life of a human being. A human being that deserves respect. Possibly even a human being whom some might refer to as a "gentleman."

Footnotes

1. For a bit more information on the Chinese philosopher Mo Ti, see page 3 of Seizing the Light.
2. For more information on Aristotle's observations with regards to the pinhole phenomenon see page 4 of Seizing the Light, page 10 of A Concise History of Photography , or page 7 of The Origins of Photography.
3. For more on devices built for the safe viewing of the solar eclipse see page 4 of Seizing the Light or pages 7 and 8 of The Origins of Photography.
4. For more on Leonardo da Vinci's writings on the camera obscura see page 4 of Seizing the Light or page 9 of The Origins of Photography.
5. For more on the Single-lens Reflex-Camera see page 301 of Seizing the Light.
6. For information on early drawing aids see pages 6 and 7 of Seizing the Light and pages 14-19 of The Origins of Photography.
7. For information on the camera lucida see page 7 of Seizing the Light and page 19 of The Origins of Photography.
8. For a bit more on Jan Vermeer and his relationship to early drawing aids see pages 7 and 8 of Seizing the Light.
9. For more on the importance of lithography in relation to the history of photography see page 7 of Seizing the Light.
10. For information of Joseph Nicéphore Niépce see pages 12 and 13 of Seizing the Light and pages 29-40 of The Origins of Photography.
11. For some information on the "point de vue" see page 12 of Seizing the Light.
12. For more information on "latent images" see page 12 of Seizing the Light.
13. For more information on the "magic lantern" see pages 9 and 10 of Seizing the Light.
14. For information on Louis Jacques Mandé Daguerre and his Daguerreotype see pages 10-45 of Seizing the Light and pages 14-19 of The Origins of Photography.
15. For information on "Beatle-mania" listen to everything ever recorded by The Beatles.
16. For more information on the accessibility of the Daguerian portrait see pages 36 and 37 of Seizing the Light.
17. For more information on what "high-artists" of the mid 1800s thought of "camera operators" see page 29 of Seizing the Light.
18. For more information on pain and the daguerreotype see pages 29 and 30 of Seizing the Light.
19. For more on Daguerre's departure from the public eye see pages 14 and 15 of Seizing the Light.
20. For more information on the requirements necessary to become a gentleman play the classic board game "Trivial Pursuit."
21. For more information on William Henry Fox Talbot's wife, Constance, see page 15 of Seizing the Light.
22. For more on "photogenic drawing" see pages 15 and 16 of Seizing the Light.
23. For a semantic look at the word "calotype" see page 16 of Seizing the Light.
24. For more on Sir John Fredrick William Herschel see pages 16 and 17 of Seizing the Light and pages 76-78 of The Origins of Photography.
25. For information on William Henry Fox Talbot see pages 15-57 of Seizing the Light and pages 53-70 in The Origins of Photography.
26. For information on William Henry Fox Talbot's patent restrictions see pages 49-57 of Seizing the Light.
27. For information on early English calotypists see pages 49-58 of Seizing the Light.
28. For information on early French calotypists see pages 59-67 of Seizing the Light.
29. For more information on "the human condition" read everything ever written by both Anton Chekhov and Raymond Carver.
30. For more on the expansion of photography to a form of mass communication see pages 57-62 of Seizing the Light.

31. For some information on the debate about the validity of photography as an art form see pages 57 and 58 of Seizing the Light.
32. For information on the initial public perception regarding the calotype see pages 49 and 50 of Seizing the Light.
33. For information on the sliding box camera see pages 37–79 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
34. For information on the folding camera see pages 37–79 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
35. For information on early English and French format standards see pages 1–10 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
36. For information on "angle of view" see pages 88 and 89 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
37. For more on calotype–paper considerations, see pages 142 and 143 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
38. For more on variations on the calotype process, see page 145 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
39. For more on Iodization, see pages 145–150 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
40. For more on sensitization, see pages 150–157 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
41. For more on "developing-out," see pages 181–204 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.
42. For more on contact printing mechanisms, see pages 186 and 187 of Primitive Photography: A Guide to Making Cameras, Lenses, And Calotypes.

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