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http://idea.uwosh.edu/nick/pinholephoto.htm
The picture, divested of the ideas which accompany it, and considered in its ultimate nature, is but a succession or variety of stronger lights thrown on one part of the paper, and of deeper shadows on the other.

William Henry Fox Talbot

*The Pencil of Nature*

1844

You know I’m born to lose
Gambling’s for fools
That’s the way I like it, baby.
I don’t wanna live forever

Motörhead

*The Ace of Spades*

1980
Who's your favorite inventor of photography? Mine is William Henry Fox Talbot. In the 1830's he invented the negative-positive process of photography with paper negatives and positives. In 1844, he published *The Pencil of Nature*, the first book with photographic illustrations. Unlike today, these weren't printed from a press, but were tipped-in contact prints from the original negatives. He wrote *The Pencil of Nature* to convey to a public who had never experienced photography what some of the characteristics of the new way of image making were, how it differed from drawing and painting, and suggested uses it might be put to, which included portraiture, fine art and some novel ideas like insurance documentation and hints at x-ray photography. For a Victorian country gentleman scientist, it's an extremely readable book, very personal and even a little chatty in some places.

The present work, consisting of photographs accompanied by a little essay, is inspired by and modeled after the *Pencil of Nature*. I've also been influenced by John Szarkowski's *Looking at Photographs*, and I remember seeing artworks in the 70's consisting of several images and a bit of text that concluded with something like “This statement and these four images constitute the nature of this work.” I don't remember any of the works, but the idea sounded like fun.

The defining feature of a pinhole camera is that the entire optical system consists of a very small hole, usually drilled into a thin sheet of metal. *The Pinhole of Nature* is about specific characteristics of pinhole images and the experience of making them, how it differs from lensed photography, and since it really doesn't have any practical use, how I
feel about it as art. I know this is a limited viewpoint, but I can't really talk with any authority about why anybody else makes art.

Talbot probably made all the pictures in *The Pencil of Nature*, but there's some evidence that his former servant, and the proprietor of the establishment which made all the prints, Nicholaas Henneman, also participated in making some of the negatives. All the pictures in *The Pinhole of Nature* are mine.
The arrangement of dewdrops on the edges of a leaf of a Lady's Mantle is probably easily explained with physics and biology. I don't know those things and it does look a little like magic. I do know a lot of the physics and chemistry (not very mathematically though) of pinhole photography, but looking at that empty cardboard box with the little tiny hole at the end, it still seems a little like magic.

This arrangement of dewdrops is unusual, but not that rare; maybe ten to twenty times in the spring and summer. I've been making a point of walking out in the garden in the morning with my coffee looking for it. After I had set this picture up and took the shutter off, a narrow sunbeam projected through a gap in the trees fell right on this leaf. Determining exposure usually involves a healthy dose of guesswork anyway, and I had to think fast when the light changed so abruptly. I actually got it a little wrong, the negative is a little under exposed, but in making the positive, it was fairly easily pulled back to the full range. The light in the image turned out to be perfect to create the illusion of depth and highlight this one leaf and create jewellike highlights on the water drops. When this number of intended actions and beneficial accidents combined to make this image, it seems like maybe more than coincidental.

One of the first written accounts of projecting an image from a small aperture in a camera obscura by Giovanni Battista Della Porta in the 16th century was in the book he titled *Natural Magic*. I once had an experience that I'm sure the average 16th century person would have
thought magic. While waiting for a photography professor to retrieve some forgotten learning aid from his office, sitting in a second floor room darkened for a slide presentation, someone in the class noticed an image of the traffic moving in the street below projected onto the ceiling through a tiny gap at the edge of the curtains.
On the other hand, it's really kind of easy to understand and visualize what's happening in pinhole photography. In this picture, the sun shone through the window, was blocked by the curtain in some places, traveled in a straight line, and recreated the pattern of the lace on the soap dish and window sill. The pinhole is like the openings in the lace curtain. Light shines on a spot in the scene, is reflected or not, in proportion to the reflectance of the material, the surface texture and the angle of the light, some of it goes through the pinhole, continues in a narrow beam, and shines, or not, on the light sensitive material. The picture is the sum of all the possible spots in the scene making corresponding dots on the film plane. Pretty straightforward. A lot easier to understand than multiple group, multi-glass, multiply coated lenses.

This picture was my submission to the first World Wide Pinhole Photography Day on April 28, 2001, an annual web coordinated and exhibited event where people from all over the world submit a photograph taken on that day with any kind of lensless cameras. There are other kinds of lensless cameras, but I think all but one or two submissions have been taken with anything but pinholes. The variation in the cameras the pinholes were installed on ranged the gamut from beer cans to Linhoff-Technika view cameras. I know this is kind of derivative of a million “Day in the Life” projects, but it's been really kind of neat to watch the buildup to the big day, and see the exhibit develop in the following month. The internet has allowed communication with just about all the other pinhole photographers on the planet. It's been kind
of amazing and sometimes dismaying to see how many people are really interested in “pinholin.” It’s nice to know quite a few others are really obsessed, so I'm not all that crazy.

However, statistically, it’s a pretty small group worldwide. Pinhole photography is cheap enough to be accessible to anyone who has access to any kind of photography. Everybody in the world takes snapshots, but just a couple thousand regularly take pinhole photographs.

My glasses were in the soapdish because I was taking a bath when I saw this. It occurred to me that it would be kind of ironic to submit a picture of lenses with a positive pattern projected onto the scene. I also find it ironic that I started really getting obsessed with pinhole photography about the time I had to start looking at the world through these lenses the rest of the time.
There are a lot of ways that would make it easier to get this picture than a pinhole camera. This is rare, delicate, easily moved scene which happened to be hard to get at with a tripod.

I do take a few pictures with lenses. I've got a digital still camera in my backpack now. They're really practical devices. But that's just not the same; when I do it, it's not “art” unless it’s pinhole. You can do anything you'd like, however.

This freedom to do anything is a big theme in the wider pinhole photography community. People make cameras out of some amazing things and do clever things to either make it more convenient or to do creative things with the image. I can't seem to do anything about the way I make these pictures. When I wonder about the famous question “Why pinhole?,” the answer I come up with sounds more like a diagnosis of obsessive-compulsive disorder. I know about lots of things to do differently, I just can't get interested. I seem to think I have to do it this way. I've had a similar obsessive behavior about getting dinner on the table at precisely 7:00 (actually fairly easy to do also), and invented an imaginary oversight group called "The people who yell," who won't allow me to do otherwise.

My repertoire of technique is thus somewhat limited to three cameras of different lengths, two tripods with wooden platforms on top with the camera affixed by two rubber bands, 4 x 5 inch sheets of Ilford Multigrade Rapid Paper for a negative, from a supply about 10 years old
now, developed in Dektol for two minutes. I suppose they're adequately fixed and washed. The negatives are scanned into Adobe *Photoshop*, adjusted for exposure and burned and dodged, scratches and other emulsion flaws are retouched, and prints are made on a color laser printer, although I have been thinking about having silver based color prints digitally output by a lab for about three years now. I'm not sure if the people who yell allow that.
PLATE IV

Muddled rose

Probably because of the long exposures and relatively unsharp optics like they had in the 1840's, pinhole photography tends to give an impression of antiquity. Pinhole images are often associated with the first decades of photography. This has been exploited rather cleverly by Ruth Thorne-Thomsen, who kind of kick started my early practice, and others. The common pinhole practice of using paper negatives is characteristic of the earliest photographs by Talbot, and the long exposures are characteristic of any large format photography.

Another common association is with the pictorialist movement of the early 20th century who had reacted against the high-tech reputation of photography by emphasizing composition, de-emphasizing detail, and experimenting with the nature of the print. There was a lively, if kind of technical, practice and discussion of pinhole photography in popular photography magazines around the time of the Pictorialist movement. The appeal of pinhole photography is often characterized as a reaction to the current ultra high tech nature of photography.

I will admit to the influence of Talbot, of course, and Julia Margaret Cameron of the early photographers, and also the pictorialists, particularly Steichen. Group f/64, mainly Weston and Cunningham, and the modern minimalists, Penn and Avedon also formed the way I see how I want to photograph things. These later photographers prized high resolution, full tonal range, clearly seen imagery.

There are two points here. The first is that if you’re looking for inspi-
ration, look to all of photography. Look for what you want to photograph, and then see what the pinhole does to it.

Secondly, as part of the larger photographic universe, pinhole images shouldn’t get any concessions for having been made with simple materials or for the difficulty involved in making them. The picture has to stand for itself.
I specifically seek things of a temporal nature, things that don't last very long. I suppose in some climates water drops on plants are constant, but it only happens every couple of days around here, and of course the plants change, and of course the lighting changes, and it looks different if you look at it from a different point of view. This of course is a characteristic of all photography. Not so visually apparent is that nothing has moved during the five or so minutes it took for enough light to fall through the little tiny hole to create a response in the light sensitive surface, a somewhat rare circumstance. This is not typical of the pinhole photography experience. Most stuff moves and the sun actually zips along the sky pretty quickly, smearing sunbeams across a scene. Part of the appeal is kind of a macho competition just to see if you can pull off getting an image at all with a pinhole camera.
Sometimes the exposures are quite long, and require precautions not usually encountered in lensed photography. This exposure was made in early January. The shutter was opened about 6:00 pm as soon as the sky was completely dark, and closed about 12 hours later. I had to be careful to get up and end the exposure before twilight began and made the sky light. It was taken with my two and a half inch camera, specifically chosen to reduce the exposure time. The pinhole is same size on all my cameras, therefore this short one has a rather low F ratio of about 128. This is the second attempt. The first exposure was only four hours. The camera was perched on the back of a side chair, leaned against the wall right next to the back door where it only took a second to reach out and start and stop the exposure. It was six degrees below zero Fahrenheit.
PLATE VII

Peace rose blossoms

Because of the long exposures, movement is a really dominating theme in pinhole photography. It was the same in the first decade or so of photography, and multiple second exposures were pretty common until the 20th century for photography of any quality. I am constantly aware of movement. You often see blurred images caused by motion creatively applied in pinhole photography, especially when contrasted with non-moving parts of the scene, but I’m a pretty straight photographer. Maybe I would get yelled at if I used movement.

It's fairly rare when the air is still enough to have plants hold still, much less a large sail like these big blossoms. This was done kind of late on a very hot, muggy, mid-July evening when I was sitting on the porch thinking a cool breeze would feel nice, when I realized they're wasn't any breeze at all! I had just built the short camera. This Peace rose had been blooming it's heart out for weeks and held absolutely still for over four minutes. I was amazed.
People often express amazement at the length of exposures. I suppose they imagine you have to pay attention to a picture in order for it to happen. I spend a lot of time in the kitchen, which has a south and a west window, through which the sun shines. So often, I'm cooking when I see things I'd like to take of picture of and I just continue doing that while the shutter is open. Since the sun falls on the south kitchen window in the winter only from late morning to early afternoon, that means, I'm usually cooking lunch. In this case, however, I was cooking Thanksgiving dinner and I think I was chopping celery during this shot. The parsley eventually went into the turkey. Edward Weston also ate the vegetables in some of his most famous photographs.

Taking pinhole photographs indoors has the advantage of having no wind to blow things around so you can take close-ups of some very delicate stuff, especially in a case like my sunny south kitchen window, if you don't bump them while you're cooking.
Seventeen of the twenty-four photographs in *The Pencil of Nature* are taken at Talbot’s home, Lacock Abbey. The abbey itself appears in eight of them.

All my photographs are taken in my house and yard in Wisconsin. It's probably because I tend to just happen on the subjects and only at home do I have the flexibility to stop and take a long exposure photograph. I'm sure I could go elsewhere and find interesting lighting situations, but I have more than enough to work on with just the stuff that appears in front of me. I am lucky to be surrounded by inspired interior design and a really spiffy if somewhat accidental garden, but I tend to see photographs in some of the less spectacular subjects like this garbage can. As famously illustrated by Irving Penn’s cigarette butts, a photograph can be beautiful regardless of it's subject.

For me, it's a very rare artificially illuminated photograph. Again, probably because of the extremely prolonged exposures, electric lighting is rare in pinhole photography. Flash is actually a little more common, probably because it's a little more technical. In addition to the back-to-simpler-times group, pinhole photography also tends to attract technological dabblers, as did the earliest decades of photography. In 1850 Talbot took the first stop action photograph illuminated by an electric spark, and in 1866, Talbot and the first pinhole photographer, David Brewster, were in the first photograph illuminated by a flash of burning magnesium.
Almost all my pictures are taken of natural light situations that just happen in front of me, but I will confess to putting things into sunbeams and arranging details.

The method of timing this exposure was somewhat unusual. The exposure was begun about 11:00 at night. I then went to bed and left a note for my teenage son to replace the shutter and bring in the camera whenever he got home.
A questioner, probably expecting some symbolic meaning, once asked Duane Michals why windows figured so prominently in his photographs. His response was because that's where the light is.

I'm a fool for a sunbeam. The south window in my kitchen is so often featured in my photographs because the sun shines in through it throughout much of the day.

This image includes a variety of interactions of light with the materials in the scene. The shape of the sink and the dish pan is defined by the sunbeams from the window, reflections define the metallic surfaces of the fixtures, the interior of the dishpan is illuminated indirectly by the sunbeams and it's shape is defined by variations in the angle of the matte plastic surface, as well as the detail of the stains on the bottom. There are a few specular highlights on the shiny porcelain sink, the semi-transparent curtains and transparent prism transmit light, the faucet and Godzilla's tail are silhouetted against the window sill, and there is even a circular projection of the light from the curved mirrored surface of the faucet's base.

This technical ray tracing discussion may explain how the illusion of depth is created, but doesn't explain my attraction to the scene. I suppose it evokes the calm of a lazy summer day, although this was done in the dead of winter. There is a beauty to the light that is hard to express verbally. Alfred Stieglitz did a series of abstracts of clouds to eliminate the emotional associations with the scene depicted. The variations in
tone and lighting seemed to express different emotions. He gave them the title “Equivalents” to express the idea of the quality of the viewers response to the light itself. I suppose this best expresses my feeling about light. As a photography teacher, I told my students that in order to be a successful photographer, you had to be in love with light.
Direct sources of light, such as windows and the sky expose the negative far faster than light reflected off an object, so silhouettes require significantly shorter exposures. The earliest existing camera image Talbot made was of the pattern of a latticed window in the South gallery at Lacock Abbey.

Virtually nothing in this scene is normal reflection of light off a surface. It's surprising how little detail can pop an image out into three dimensions. In this case the lamp’s base, which is partially a reflection of the light bulb itself, and the grey scale in the curtains, which are variations in the amount and density of the fabric the light has to get through, are the only things in the picture that aren't featureless black. I'm surprised silhouettes aren't more common in pinhole photography.

About a year after I took this photograph I saw a picture of a palm in front of a window that looked just like this in a 1905 issue of The Photo-Miniature dedicated to pinhole photography.
PLATE XII

Elwood playing the blues

Talbot included two photographs of “The bust of Patroclus,” a sculpture of white marble, in *The Pencil of Nature*. Accompanying the first he writes about short exposure of bright objects and how objects give different impressions from different angles and lighting. Elwood, who now has a featured role in the fountain in our back yard, takes the role of Patroclus here. Elwood is also featured in Plate XVI. Both photographs are taken from about the same vantage point with the same camera. From this side Elwood himself is lit about the same in both images, from the reflected light from the shaded white wall of the house, but the lawn and garage behind him are quite different. In this photograph, Elwood is silhouetted against the softly lit garage and driveway, outlined by the backlighting from the sky. He seems to be wailing the blues. In the other photograph, he is backlit by the afternoon sun, has a little more detail in the front, is more strongly outlined against the shadowed background and seems to be really rockin' out.
PLATE XIII

Salad spinner

Somewhat oddly for a pinhole photographer, I'm trying for rather formal composition. I'm basically an abstract expressionist at heart. Many pinhole photographers use conventional cameras where the lens has been removed and replaced by a pinhole, but most I think use home made cameras, made out of a vast array of containers and materials, and most of these have no viewfinder. My cameras are simple boxes made of foamcore. This creates some difficulty in achieving formal composition. You really have to previsualize the picture. Ansel Adams sent workshop participants out with a cardboard frame to look for images before he let them look through a camera.

There are ways to geometrically determine the limits of the image. On the top and one side of my camera, I put white map tacks at the locations of the limits of the paper in the back and the location of the pinhole on the front, and then sight down these imaginary lines to determine what's in the picture. It's hard to be perfectly exact so there's always a little surprise when you finally get to see the image.

The photographic paper I use for a negative is a lot more contrasty than my vision, and what are totally shadowed areas here looked fairly brightly lit at the time. I'm sure I couldn't see that the drop of water and the highlight of the window's reflection made this little incursion into the deep shadow, just enough to define the plane of the top of the salad spinner. Talbot expressed amazement at seeing details in his photographs that he hadn't been aware of when he made the exposure.
This uncertainty and the excitement at seeing how a picture will eventually turn out is often expressed as an appeal of pinhole photography.
Pinhole photographs are admittedly not as sharp as photographs made with lenses. However, they’re not often enlarged. Using large negatives and contact printing them has always been the most common mode for pinhole photography, resulting in a print the same size as the negative, although there is now a lively practice of 35mm pinhole photography.

By the nature of the process, contact printing generally yields an un-cropped view of the entire negative, and this may contribute to the tradition of using the entire negative in pinhole photography. There is also a strong philosophical tradition of using the whole negative in lensed photography where enlargement and cropping are simple matters. The most common expression of this idea is Ansel Adam's musical metaphor “The negative is the composition, the print is the performance.” The really creative, expressive potential of photography, when you have the most control, when the authorship takes place, is when you make the negative, and if you do the negative right, composition is already done.

I'm on the side of always using the entire negative and I did when I used lenses too. I filed out my negative carrier to show the edge of the negative. Whether cropping an image is acceptable or not always sounds a little like a religious argument.

Despite the ease of doing it with digital methods, I never enlarge my pictures either, again imitating contact printing, and this also feels like a religious belief.
This photograph was taken with my long camera, ten inches. Expressed in the scale of a 35mm camera, it would have comparable focal length to a 90mm lens, moderately telephoto, but in the pinhole world this is a really long camera. The pinhole is the same as in the other cameras, so its F ratio becomes a whopping 512, slightly smaller than the mathematical ideal, but it produces extremely sharp images at a cost of even longer exposures. In a brightly sunlit, mostly white scene like this, they're still manageable, about two minutes.

Pinholes don't have focal length like lenses since they don't focus, but pinhole photographers can't help but using the term since the distance the pinhole is from the image plane has exactly the same visual impression of perspective, space and magnification as focal length on a lens.

This also means a pinhole camera of any focal length costs about the same. This is particularly significant with extremely wide angle lenses, which are very expensive, but with a pinhole camera, you just use less cardboard.
The optical effect most associated with pinhole photography is infinite depth of field. If it’s not moving, everything from the closest to the most distant object appears in focus, but there’s no focusing going on, it's inherent in the image making process. Pinhole cameras are truly focus-free.

This is both a positive and a negative thing. On the negative side, it is impossible to have a sharp object separated from an out of focus background as you can with a large aperture lens. Tonality and lighting are the only tools you have to separate subject from background. On the positive side, you never have to even consider focus, a constant concern with lenses.

Extreme close-up photography is complicated with lenses. Depth of field is critically shallow, extension tubes are often needed to bring the object into focus, and because the lens then is farther away from the film plane, a difference in exposure must be compensated for.

With pinhole you just put the camera closer. Otherwise, the relationship of distance to the object, focal length and image size is the same as with lenses. This image was taken with the six inch camera, with the pinhole about three inches from the lemon, so the image on the negative is magnified about twice the lemon's actual size.
Talbots process utilized paper as base for the light sensitive surface, and the use of transparent glass wasn't developed for ten years.

The choice of photographic paper as a light sensitive medium for pinhole photography has a lot of practical aspects. It's cheap, easy to process with readily available chemicals, and can be handled under a broad range of safelights.

The choice does have an impact on the image. It certainly contributes to long exposures. In bright light situations film would reduce the exposure times to seconds, but, at longer exposures in the multi-minute range, the failure of the regular relationship of exposure and time, an effect usually termed reciprocity failure, leads to almost as long exposures with film as with photographic paper, and paper costs ten times less, and you don't have to process paper in total darkness.

Black and white photographic paper's insensitivity to red light allows it to be handled while you can see it, but also makes it more sensitive to blue light than your eyes are. Elwood is actually a darker blue than he appears here. More critically to this image, there probably wouldn't have been any detail on this shadowed side if he'd been yellow or beige. This same effect makes it almost impossible to record the difference between white clouds and a blue sky.

Talbot specifically pointed out the increased sensitivity to blue light and his papers must have been relatively insensitive to light the color
of safelights because he refers to drying it by the fire.

Both images of Elwood were taken with the two and a half inch camera and exhibit some characteristics of short cameras. The most noticeable is the wide angle of view and accompanying expansion of space. The pinhole is the same size as my other cameras but it's a lot closer to the image plane, so the F ratio is lower, about 128, and exposures consequently shorter. With lenses, a larger aperture (although I don’t think any lens photographer is going to call f128 a large aperture) is usually associated with loss of sharpness, both through limited depth of field and the fact that lenses are actually less sharp at larger apertures. With a pinhole, sharpness is determined solely by the physical size of the pinhole and depth of field is always infinite by nature of the image forming process, so F is revealed for its true nature, a measure of the intensity of light falling on the film plane. This inherent speed boost of short pinhole cameras is quite an advantage. Extremely wide angle pinhole images are extremely popular.

It also bears the marks of an inevitable exposure characteristic of wide angle pinholes with flat film planes. The edges of the negative are quite a bit farther away from the pinhole than the center and therefore the light spreads over a greater area and is reduced in intensity, so there is a pretty strong exposure gradient between the center and edges of an image. The effort to overcome this geometric inevitability of short optical systems is one thing that contributes to the expense of extreme wide angle lenses.

Here it makes Elwood's head much darker than his midsection, emphasizing the outline from the backlighting from the sun which contributes to the impression of rock and roll.
This is one of two pictures that were taken specifically to be included here (The other is the next one). It was taken with a camera and pinhole that were made by a 6th grader, who accidentally took home one of the demonstration cameras I had made instead of his own. The cameras I have participants build in a workshop all look pretty much the same although I encourage decoration.

The original design was given to me by Ruth Thorne-Thomsen, whose pinhole photographs are in major collections all over the world. She used a camera of this design, but with the surface completely covered by tape from constant repairs by the time I saw it. I was asked to invite the juror for the student art exhibit one year at the Midwestern college at which I taught; quite a privilege for an unofficial part-time faculty member. I was really into multiple images like Ray Metzker's at the time and knew he was teaching at Columbia College in Chicago so I gave it a shot. He replied that he wasn't there in the spring, and he recommended Ruth, who accepted the invitation. The juror also typically gives some presentation on their own work, and Ruth put on a great workshop for about 30 people on the Saturday following the opening of the exhibition, which happened to be a beautiful spring day. This wasn't my first pinhole attempt, but it was the first really successful one and has became the method I've used from then on.

In a workshop, a camera like this takes about an hour to build and they're usually lighttight on the first try, possibly because I'm constantly harping on it, with any light leaks we do find fixed with a few additional
pieces of tape. Pinhole drilling is usually accomplished perfectly on the first try. It's really pretty easy to do.

Made out of decent matboard and using good tape, a camera like this costs about a buck. My cameras, illustrated in this photograph, are the deluxe model made out of black foamcore, for about $2.50. Any graphic arts shop is likely to have a big pile of scraps of this stuff big enough to make cameras out of.

This is a portrait of my three cameras. The first was the six inch. I had always previously used the five inch matboard camera exactly as built in that first workshop, but when I decided to get posh and build a foamcore camera, because I was interested in close-ups, I made it slightly longer. The two and half inch was made specifically to reduce exposure times in order to photograph plants in the garden, and the ten inch made to get closer to a plant on a window sill without sticking a tripod in the kitchen sink. Also portrayed are my tripods, the tall one the workhorse of decades, and the small one recently acquired to get closer to the ground. The kitchen timer, leaned against the box under the six inch camera, is timing the exposure.

Partially in reaction to megacorporate photography, and partly for the satisfaction of self sufficiency, a big attraction of pinhole is making your own camera. Cameras are made out of about any container you can think of. People have taken photographs by putting the film in their mouth and using the gap in their teeth as the pinhole. This creative engineering aspect of camera design drives a lot of pinhole photographers.

Very often, because these containers are round boxes or cans of one sort or another, they have curved film planes, which corrects somewhat for the exposure differential from center to edge since the pinhole is more
equidistant from all points in the image, but stamps a characteristic distortion of curved film planes on the image—curved lines which are straight in the original scene.

I prefer the geometry of a flat film plane, but because the film back is sometimes slightly smaller than 4 by 5 inch sheets of paper, it gets warped when it's pressed into the camera back, which introduces random distortions which can give a hint of funhouse mirror effect to the image, which is kind of fun.

Unlike a lensed camera, this uneven surface is perfectly in focus. Just as the house in the far distance is just as in focus as the nearest foreground, it is also in focus although the paper curved out toward the pinhole in this corner of the negative.

This image demonstrates one measure of the difficulty of pinhole photography. While the exposure was occurring, I just stood there and drank the cup of coffee.
The first use of the term pinhole for a tiny image-forming aperture and the first account of a photograph taken with a pinhole cameras is in the 1856 book *The Stereoscope* by the Scottish scientist, Sir David Brewster, who was a friend and collaborator with Talbot. After an extensive description of stereo vision and stereoscopes and a constant sarcastic crabbing about the work of his rival, Sir Charles Wheatstone, who was also a friend and collaborator of Talbot, he repeats a short description of the basics of image creation by a small aperture he had already used three chapters previously, and then states “The Reverend Mr. Egerton and I have obtained photographs of a bust, in the course of ten minutes, with a very faint sun, and through an aperture less than the hundredth of an inch: I have no doubt that when chemistry has furnished us with a material more sensitive to light, a camera without lenses, and with only a pin-hole, will be the favourite instrument of the photographer.” He then questions anyone’s ability to deal with exposures of this length and goes on about using lenses for stereo photography.

At one time, I thought I had heard a reference to Talbot using pinhole cameras, possibly because his earliest cameras were simple boxes like my cameras, but with lenses stuck on one side. He was considered an expert in optics even before he invented photography and was certainly aware of the principle of images formed by small apertures.

Stereo pinhole photography is characteristically easy. It’s a simple matter of using two identical cameras side by side, or one camera moved a bit to one side to make a second exposure. The closer the objects in the
picture, the smaller the separation between the cameras needs to be, and with my 4 x 5 inch cameras side by side, this is about as close as you can get without the images being so different that the brain can't fuse them back into a three dimensional view. By using wide separations you can create stereo effects of distant scenes that would be considered at optical infinity.

There are numerous methods for viewing stereoscopic pairs. This image is set up for the “crossed-eye” method which requires nothing but your eyes and brain. Unlike other stereo viewing methods, the right hand camera image is on the left, and vice versa. When you cross your eyes, you see a double image, in the case of a stereo pair, four pictures. The more you cross your eyes, the farther these images separate, until the middle ones coincide. Then concentrating on some detail in the image, you can bring it back into focus, your brain fuses them, and the image pops into three dimensions. It’s much different than looking at a single image. You can’t really take in the whole picture, you have to look around at things the way you would if you were looking at the original scene.

In this image the petunias in front of the vase are hardly noticeable as they merge with the crossbar of the screen, but when viewed stereoscopically, they stand out clearly floating in front of the background.
Although many pinhole photographers use conventional cameras and films which can be commercially processed, using photographic paper for the negative, some sort of darkroom is required. This is my darkroom, which existed in the house when we bought it, including the 1940’s era Federal enlarger.

It’s only about 5 x 6 feet, although the wide angle of the short camera makes it look a little more roomy. I have the luxury of a sink with running water but almost any space that can be made lighttight can be used for developing paper negatives. Bathrooms and closets are common makeshift darkrooms. Ruth Thorne-Thomsen processed negatives on a moonless night on the shore of a stream in a Mexican arroyo. Virtually no special equipment is necessary, only three containers of almost any kind to hold developer, stop bath and fixer, and some sort of safelight to see what you’re doing. I have used red 99 cent “party bulbs” from the grocery store as safelights for years.

As you might expect in a dark room, this is about the longest exposure I’ve done intentionally, around 24 hours.
For the artist, one of the greatest consequences of the negative positive process is the endless expression that can take place during the making of the positive. Even those who use the ultra-precise zone system for exposure determination previsualize burning and dodging manipulations and a change of overall impression of the light that they will use when making the positive.

This flexibility is partially inherent in the media. More range of light can be captured in a negative than can be rendered in a positive, giving a wide range of possibilities to accurately exposed negatives, and still a few options with a marginal negative, which also means relatively great errors can be recovered from.

I guess at the exposure times for my photographs. I have a pretty good feeling for the response of the paper, and base my guesses on the kind of sunny—cloudy bright—cloudy tables that used to be included with every roll of film. I'm surprised how close I come most of the time. I completely blow it about ten percent of the time. My negatives range in density quite a bit, but most are in the range I could get a decent print out of them. This may seem a bit risky, but it gives kind of a gambler's rush to the experience.

I scan the negative and make prints on a color laser printer. Digital scanning and manipulation gives exactly the same kind of controls as can be done with your hands, chemicals and a timer in the darkroom, except the range of effect is greater, and the fineness of the manipu-
lation is more precise. It also has the advantage of being able to produce exact copies of an image.

This image, my submission for Worldwide Pinhole Photography Day in 2003, is overall dangerously underexposed, with a very overexposed highlight from the sunbeam. It was rather extensively pulled back to a full range of tones, and some burning and dodging were done to bring down the sunbeam, and bring out the curve of the bathtub on the right. I'm not sure if I could have come up with this good a print with traditional darkroom methods, and it would have taken me forever, wouldn't be easily repeatable, and driven me crazy. I've never romanticized darkroom work.

A common response is that it is rather incongruous to make a negative by the most primitive method possible, and then, use such high tech methods to make the positive. It is ironic, which is kind appealing, but ultimately, it's just the best way for me to “perform” my negatives. I'm sure these same kind of ironies were noted when Muddy Waters started using a Telecaster to play the blues, initially as a pragmatic matter in order to be heard over the rest of the band, but eventually becoming an integral part of the expression.
I do miss double weight, fiber based silver prints on premium quality paper. I keep a contact print of this image in my office to keep me grounded as to what a real photograph looks like. I do think color laser prints have a beauty of their own, and there’s kind of a punk, democratic appeal to the cheapness and repeatability of laser prints. Digitally output black and white prints on color photographic paper rival silver prints without close inspection. Many workers who output digital prints use inkjet printers with special ink and fine quality papers.

Talbot commented on how nice it was to have a variety of shades of color that could be elicited by slight variations in the process, and since Talbot and Daguerre announced their processes within weeks, variation in modes of positives was a basic part of photography from the beginning. As with camera design, just about every possible combination of printing methods that has ever existed, digital and traditional, shows up in pinhole photography, and I’d bet there’s a significant overlap in the pinhole photography and alternative photographic processes e-mail discussion lists.
This is the oldest photograph included here, and the only one not done in my house and yard. In my basic photography course, I required a self-portrait, and I demonstrated in class techniques for making sure you retained authorship of the composition and timing of the picture. The next term after Ruth Thorne-Thomsen's visit, I had taken three such demonstration self-portraits, including one where I jumped off a ten foot wall and was photographed suspended three feet above the ground looking like I was about to die. I wasn't happy with any of these images so before the next class session, I took one picture holding a pinhole camera against a tree to hold it still, and this one, with my chin resting on a concrete bench in order to hold my head still.

I've always been fascinated by painted portraits and thought that the long exposures of pinhole photographs might result in the calm demeanor depicted in paintings. Every time I try to experiment on myself, I end up looking extremely crabby, so I haven't been able to get up the courage to ask subjects to sit through long exposures for what might be a decidedly unflattering portrait. Portraits aren't rare in pinhole photography, but they are a little uncommon.

I use this image as my “avatar,” the little picture that accompanies my posts on the on-line pinhole photography forum at pinholevisions.org. I've always thought it was a little curious that most of the other participants used portraits obviously done with lenses.
Talbot included a picture of glassware in *The Pencil of Nature*, and transparent glass is often considered a difficult subject to capture. It was an assignment in Advanced Photography in college, and I think I only got a B on that project.

The first surviving negative is a picture of a window that Talbot had installed when he remodeled the south elevation of Lacock Abbey. This is one of the first pictures taken in the south kitchen window that I frequently photograph. Shortly after this image was taken, the kitchen was remodeled and the sink was put in this location.
Serendipity is a concept often associated with pinhole photography. This image has a curious half-hazard composition and angle. Late nineteenth century painters noticed the odd juxtapositions that occurred in what was emerging as snapshot photography and incorporated these compositional accidents in their paintings.

I can hardly claim authorship to this picture. One afternoon, I saw something I wanted to photograph and went down the basement to get a camera. I noticed that the black masking tape shutter had fallen off, so I changed the paper and put the one I had removed from the camera in with the other exposed negatives, more or less out of habit. I have no idea how long the shutter was off. I had last used the camera three weeks before.

I develop four negatives at a time, and I noticed this one came up very fast in the developer, and pulled it rather quickly, but I’m not sure how long it was in there.

The negative turned out to look almost perfectly exposed.

There is a window and two light bulbs in this scene that would have been extremely overexposed, but they happened to be behind the drawing table and bookcase from the point of view where I had set the camera down. There is also a light bulb just out of the top of the scene that is turned on everytime someone goes down the basement, but somehow, it’s not recorded either.
The object in the foreground is a sheet of matboard wrapped in plastic, sitting right where it was put after being brought home from the art store. The patterns on it are very curious. Short development times with very overexposed images can leave a pattern of uneveness to an image, but these are too regular and don’t appear in the other highlight area behind the drawing table. The primary illumination is from a north window just above the camera. The sun occasionally reflects off the windows of the house next door and sunbeams fall into the dining room above this scene, so possibly the patterns were painted on by moving faint patterns from similar reflections into the basement.

Happy accidents seem to follow pinhole photography around.
The Pinhole of Nature
was produced and served on
Macintosh Computers
It was written in Simpletext
The images were scanned into
Adobe Photoshop with Nikon and Epson Scanners.
It was laid out and exported to PDF with
Adobe PageMaker and Adobe InDesign
It is distributed on the web with OSX Server

The typefaces are URW Garamond Regular Narrow, a
contemporary redesign of the old style faces of the 16th
century French type designer, Claude Garamond and the italic
is Baskerville based on the early modern faces of the 18th
century English typographer, John Baskerville.
Both are by the German digital type foundry URW++. 