Troubleshooting - digital negatives

Although making a basic negative in the computer is quite straightforward, there are a number of things that can go wrong. Below are some of the most common problems you can encounter. Also consider your own set-up and equipment when trying to find solutions.

Bleed

Too much ink on the film may cause the negative to bleed and cause blur or fuzzy lines. It happens when the material doesn't absorb the ink.
Solution: Use a printer setting with less ink, such as "transparency".

Stripes

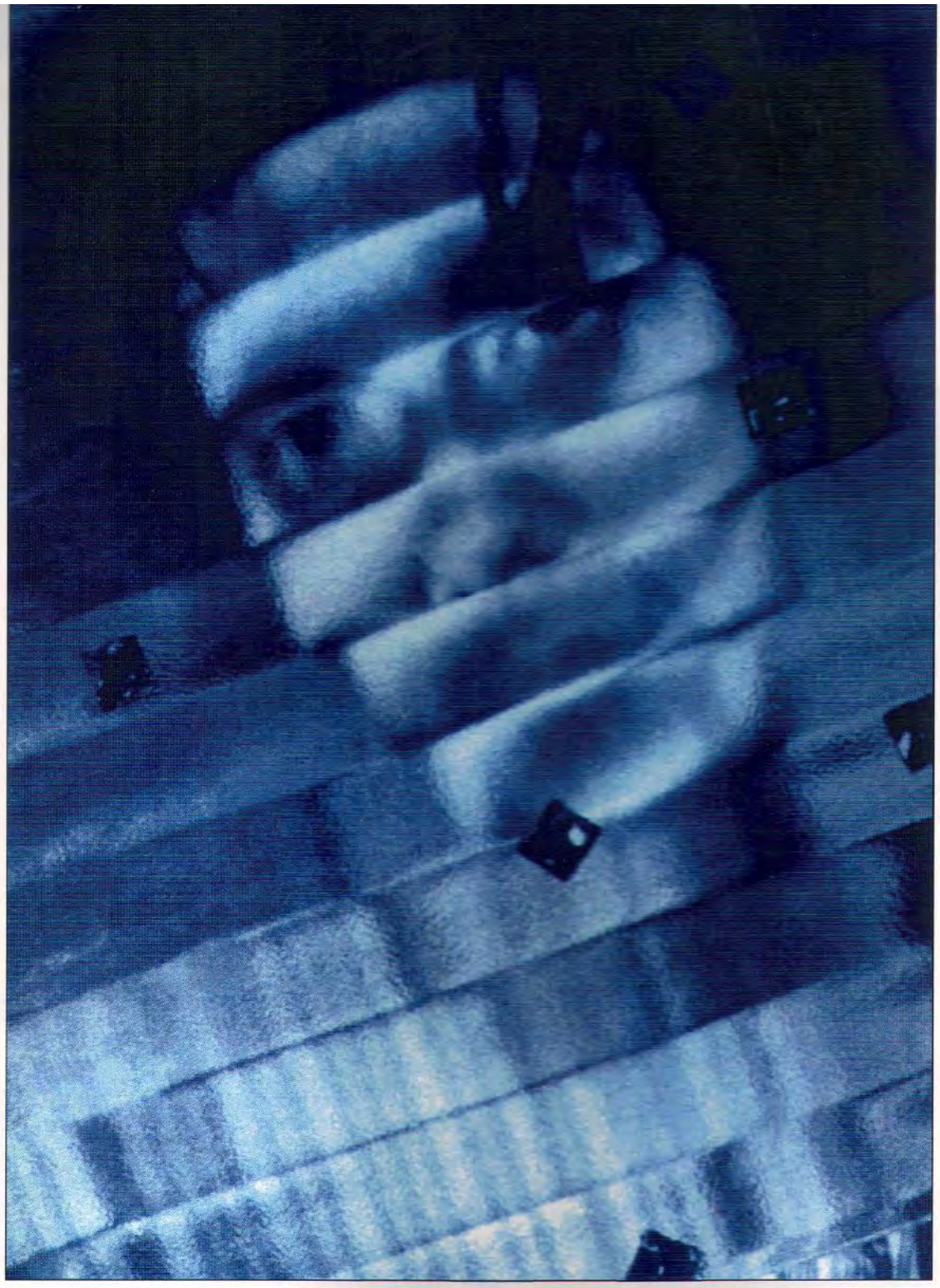
Too little ink on the transparency may cause stripes on the negative, there is not enough ink to cover the area.
Solution: Use a printer setting with more ink, a higher lpi (the printers dpi) such as "Photograph, highest quality".

Too thin negative

A faint image on the transparency when you print it out may result in a too "thin" negative. When printed the result will be a near dark blue image. Print two negatives and use them on top of each other or try making a new negative altogether.

Too dense negative

A near black image will result in a white canvas when printed as a cyanotype. The result will be a faint image, hardly visible. Make the negative a lot lighter or thinner before printing it out.



"Miss Julie" by Robert A. Schaefer Jr. ©
Miss Julie was taken with a Canon F1 using a 50 mm lens. It is not manipulated but shot through fluted glass. Robert's photographic imagery deals with layering and this portrait is no exception. The negative had to be enlarged from 35 mm. A digital negative was made from a scan, and printed on clear acetate. It was printed on Arches hot pressed 140 lb. watercolor paper using a kit of New Cyanotype chemicals from Photographers' Formulary. The paper is much smoother than the cold press and therefore easier to coat. The cyanotype was printed using a sun lamp for around 30 minutes and then placed in a tray of 2% hydrogen peroxide and water to enhance the blue in the print, washed again and dried.
More of Robert's work can be seen on www.AlternativePhotography.com/artists/robert_schaefer.html

Printing - contact frames

Unless the object you are printing has very defined edges and is in immediate contact with the material, the print will come out slightly blurry, or soft.

A contact frame will help you keep the negative or objects in close contact with the material, resulting in a sharper print. You can buy contact frames – the type used in traditional darkroom work to make a proof of negatives. These frames are great to use, but if you want to avoid the cost and the size limitation you can build a simple contact frame quite easily yourself. Doing a lot of printing it may be worth investing in a professional contact print frame, like the one from Douglas Kennedy below.

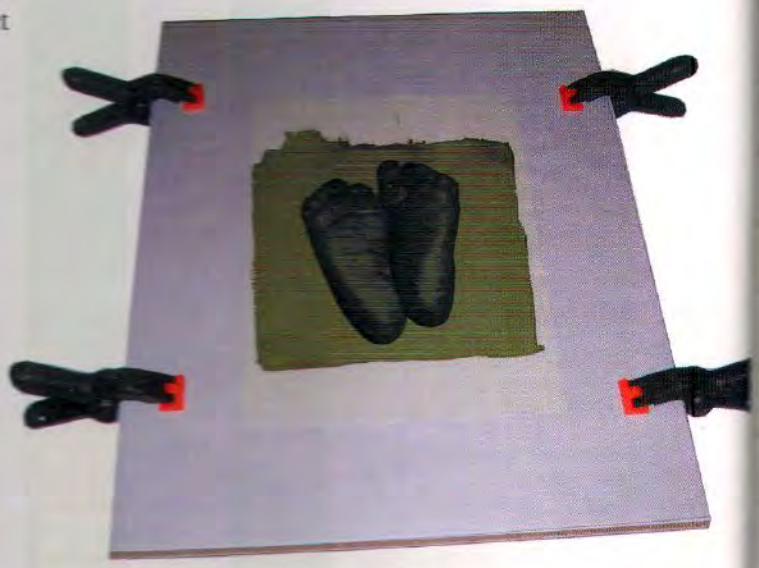
Making a contact frame

Only a few readily available items are needed to make a contact frame:

- A board, very stiff card or piece of glass to use as backing.
- Glass, at least 4 mm thick but not thicker than 8 mm. Sand the edges of the glass with a light sandpaper so that you don't cut yourself. Perspex also works.
- 4 clamps – the type found at hardware stores.

All you need to do is put the material on top of the board, the negative on top of the material, the glass on top and hold the sandwich together with the clamps.

An ordinary picture frame can also be used, the "frame less" type using metal clips (like the one below) and four clamps. It is a very inexpensive and quick way to acquire a contact frame.



UV sources

UV light - Ultra Violet light - is used to print cyanotypes. Natural sunlight is the traditional light source, but light boxes and UV lamps can also be used. The chemicals are absorbed by the material when coated. When the iron salts are exposed to UV light they are oxidised. Once rinsed, they produce a high contrast blue image.

When I first started printing cyanotypes it took some time to get exposure times right. When the sun was in zenith half the exposure time was enough compared to later in the afternoon. I lived in London at the time, where the sun is not as strong as, say, Florida, and the exposure times were therefore much longer. The long exposure times of up to an hour also meant that in a whole day I could only produce a few prints. In the winter the exposure times were up to three hours, and on rainy days it was not possible to print at all. If you live in an area where it's hard to rely on the sun, I'd recommend getting an UV lamp or a light box. It will give you more control of your exposure times since you don't have any clouds passing by. It also radiates the same intensity of light, whether you print at midday or in the afternoon.

Outdoor printing in the sun

Printing cyanotypes in the sun is a wonderful way to spend the day outdoors. Although exposure times will vary throughout the day, that is also part of the pleasure of experimentation.

Printing outdoors on a bright day in a hot climate will take about 5-10 minutes. On a summer day in northern Europe the printing time may be around 30 minutes. Place the contact frame perpendicular to the sun for best result. For more guidelines see the Exposure time chart on the next page.

Tanning units

A very easy and relatively inexpensive way to print your cyanotype is to use a face or body tanning unit. The light they emit should be around 340 – 380 nanometer (nm).

Place your composition between 25-40 centimeters from the tanning unit when printing. Use goggles when working under the lamp to protect your eyes from the UV light. The exposure time depends on the strength of the light source.

UV light boxes

An inexpensive way to get a reliable light source is to build your own UV light box. You need to be a bit handy and have the right tools. You can of course also buy a UV light box.

Exposure time depends on the intensity of light and the distance from the material to the light source. The best way to determine the right time is to make a test strip.

Exposure times

The exposure times here are taken from *The Big Cyanotype Exposure Survey* at AlternativePhotography.com where artists responded from all over the world with their personal experiences regarding exposure times. Many thanks to all those who contributed to the survey.

The times are not an exact science, but approximate starting points to help determine exposure time. Apart from the strenght of the sunlight, times are also dependant on the density of your negative: a very dense negative requires longer time, a thin negative shorter. The times shown are measured at midday, so an afternoon or early morning exposure will be longer.

1. Bergen, Norway
Summer: 5 minutes

2. Chester County, Pennsylvania, USA
Summer: 1 - 5 minutes

3. Colorado Springs, Colorado, USA
Summer: 15 - 20 minutes
Winter: 10 - 20 minutes

4. Edmonton, Alberta, Canada
Summer: 10 - 15 minutes
Winter: 15 minutes

5. Grand Forks, British Columbia, Canada
Summer: 1 - 3 minutes

6. Heidelberg, Germany
Summer: 10 - 20 minutes
Winter: 10 - 30 minutes

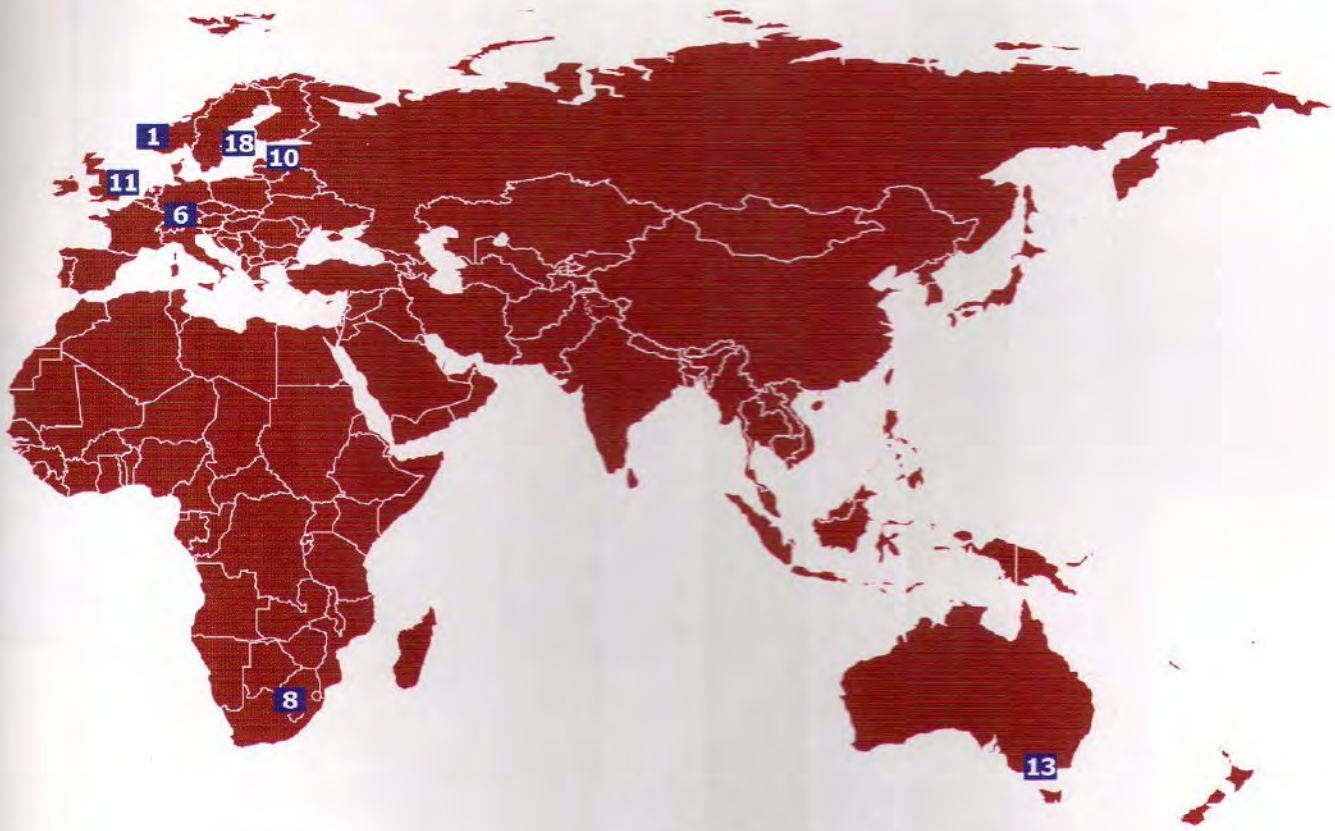
7. Jamaica
Summer: 30 minutes

8. Johannesburg, South Africa
Summer: 8 minutes

9. Juneau, AK, USA
Summer: 20 - 40 minutes
Winter: 60 minutes

10. Kalingrad, Russia
Summer: 5 - 12 minutes
Winter: 4 - 6 hours

around the world



11. London, United Kingdom
Summer: 10 minutes
Winter: 2 - 3 hours

12. Los Angeles, USA
Summer: 10 - 20 minutes

13. Melbourne, Australia
Summer: 10 minutes
Winter: 30 minutes

14. New York, USA
Summer: 15 - 20 minutes

15. New York State, USA
Summer: 10 minutes
Winter: up to an hour

16. North Carolina, USA
Summer: 10 - 15 minutes
Winter: 30 minutes

17. San Francisco, USA
Summer: 3 - 4 minutes
Winter: 5 - 20 minutes

18. Stockholm, Sweden
Summer: 15 - 30 minutes
Winter: A day in the window

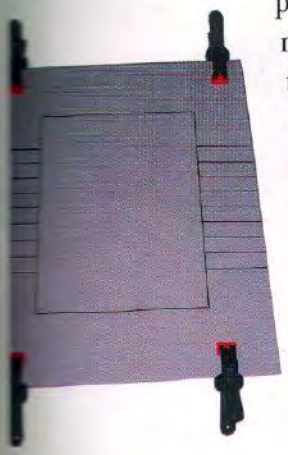
19. Toronto, Ontario, Canada
Summer: 10 minutes
Winter: 40 minutes

20. Winston, Georgia, USA
Summer: 45 - 60 minutes

"Spinney in the autumn" by Jim Read ©
The Spinney is in Hampton-in-Arden and is part of the old Forest of Arden, once depleted but now on the increase again as the planting of the National Forest gains pace. Jim really liked the curve of the footpath edges and the low light of the almost winter sun gives the picture depth and contrast. He had just made his own 5x4 inch wooden camera and this was one of the first pictures he made with it. He scanned the negative and then made another digital negative to make the cyanotype with. The photograph was printed using the original classic cyanotype formula using a facial solarium for the exposure, 11 minutes at 12 inches.
More of Jim's work can be seen on www.AlternativePhotography.com/artists/jim_read.html

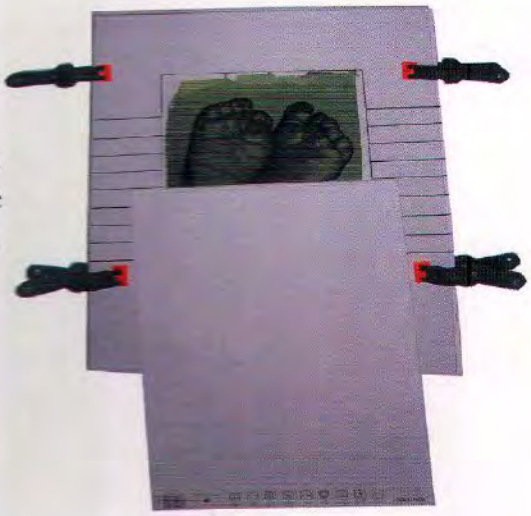
Exposing the print

Cyanotype is one of the slowest historical printing processes. A slow process means it needs a long exposure time and takes a long time to print. Too light or too dark print? Make a test strip! If your print comes out too dark, you have probably overexposed it, that means it has been exposed for too long. If your print is too light, it is probably underexposed. It is worth spending a little time making a test strip to help you determine the right printing time.



I find that it's easier to keep track of where the lines for the different exposure times are if I mark a paper with the different intervals and use it underneath the print.

The strip has now been exposed with 10 different times and developed. Take a look and decide which of the exposures will give you highlights, mid tones and shadows that look right. Expose the final print with the same exposure time.



*The times mentioned assumes your approximate exposure time is around 10 minutes. If you're in a hot climate your exposure time may be much shorter and you could do the test strip at 1 minute intervals. If you're in a cold climate and your exposure time is around 30 minutes, you can use 5 minute intervals instead.

How to expose the test strip:

- Arrange your composition on a strip of the same material you will be using for your print, i.e. not a whole sheet or a big piece of material.
- Take the composition out in the sun, or place it under the light box.
- Cover all but a 2,5 centimeters / 1 inch with a thick card.
- Expose the print for 2 minutes*.
- Move the card down a little, exposing more of the strip.
- Expose for another 2 minutes*.
- Move the card down and so on until you have exposed the strip for 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 minutes*.
- Rinse the strip under cold water.

"Cabbage Cross Section" by Wynn White ©
This image was taken in 1996 in Walnut Creek, California. "Cabbage Cross Section" was made after a trip to the grocery store when Wynn was visiting his sister in the United States. The cabbage leaves were deep red on the outside and Wynn thought that cutting the cabbage in two would reveal the cabbage's inner structure.
Wynn used a 4x5 camera to make the negatives in natural light. The prints were made using the new cyanotype process and the light source was a homemade UV printer. All of the ingredients for the sensitizer were purchased in a chemical supply store in Tokyo. It was printed on Albireo paper.
A full description of Wynn's printing technique can be found at: http://www.wynnwhitephoto.com/cyan_notes.html.
More of Wynn's work can be seen on www.AlternativePhotography.com/artists/wynn_white.html

Processing and drying

Processing with a wash

Cyanotypes are processed simply by rinsing them in water. No developers, stop baths or fixers are necessary.

After completing the exposure, wash the print in water to remove any unexposed emulsion. Rinsing the cyanotype will turn the exposed areas blue and the unexposed yellow areas white. The print will not take on its full vibrant blue color until it dries and oxidizes fully. This will happen over the next day. To speed this process up you can dip the print in mix of tap water with a 2% hydrogen peroxide solution.

Put on your rubber gloves for the rinse and use running water. Rinse the cyanotype under the tap until the water runs clear. Rinsing can take between 10 and 20 minutes. A too short washing period will leave chemical residue on the print, which can cause it to fade. Washing for too long can lighten the image if the water is alkaline. Rinse until all chemical residue has disappeared and no traces of yellow can be seen in the highlights.

If you don't have access to running water or want to rinse outdoors, you can use a series of buckets for the rinse. Change the water frequently.

Warning: If you're using a darkroom sink or any other area where chemicals are used, make sure the cyanotype chemicals don't come in contact with acids, such as your stop bath, since this can cause a highly toxic gas.

In some places the local authorities add an alkali to the water to raise the pH. This will destroy any cyanotype. In this case, rinse the print using distilled water.

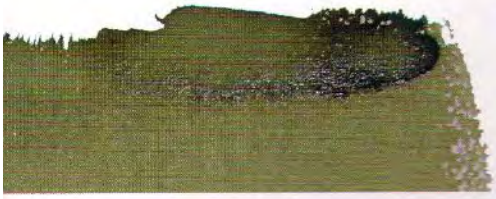
Drying your print

After washing, dry your cyanotype away from sunlight. Hang the print on a clothesline - plastic, not rope - and peg it up with plastic – not wooden - pegs. To speed up the drying a hair dryer or hot air fan on moderate heat can be used. Alternatively lay them on a flat well ventilated surface to dry. Fabric or cloth can also be dried in a clothes dryer on moderate heat. They can also be ironed afterwards using moderate heat. After the print dries it will oxidise to its final deep blue color.

Troubleshooting - printing

My print disappeared when I rinsed the material!

It could be that your exposure time is too short. Try doubling your exposure time or make a test strip to determine the right printing time. Another reason may be that the chemicals did not stick to the material. Did you print on a natural material or was it synthetic? The chemicals will only fasten to natural fibres, not synthetics, so try using a different material.



There are blotches on my print!

Blotches may be caused by careless coating - like the one to the left. Coating with too much solution may pool and dry unevenly causing white blotches (shown here as dark green) that will show up when you rinse. Start again, and coat more carefully next time with less solution on the brush.

My print is blurry!

The negative may not be in close contact with the material. Are you using a contact frame that is tight enough, or can the negative "lift" from the material?

I'm not getting a print at all!

Is your contact frame using glass or plastic that has properties that block UV light? Are you using a UV lamp that is old or has lost its UV properties?

I hung my print on the wall and now it's fading!

The blue in the cyanotype will fade in alkaline conditions and strong light. But all is not lost! Believe it or not, fading prints can sometimes be restored by putting them in a dark cupboard with plenty of air, such as a dark airing-cupboard. A few days later the blue will be back.

My print is too light / too dark!

Read the section on exposure times on and printing, and if you're using a digital negative, also read the section on making computer negatives.

"Perugia 2003" by Henk Thijs ©
The picture was taken in 2003 in Italy in Perugia. Henk was attracted to the unexpected poster with the image of "Il Duce". Obviously there was a public interest in buying posters of such a war-criminal. The double "Max Mara" in combination with the headless dog made the image complete for Henk.
The camera was the Voigtlaender with the 12 mm wide-angle lens, a 400 ISO B/W Kodak TRI-X film. A positive was made on Ilford Multigrade, the negative on Arista halftone film developed in diluted Dektol (1:10). The cyanotype procedure is the classic formula, one part 'A' plus one part 'B', on Stonehenge 250 gsm aquarel paper. The light source was a tanning machine from a flea-market.
More of Henk's work can be seen on www.AlternativePhotography.com/artists/henk_thijs.html

Creative uses for cyanotypes

Because you can print cyanotypes on such a wide range of materials, there are almost unlimited "uses" for the final print. You can frame the print and hang it on your wall, you can print a T-shirt, make pillowcases, quilts, curtains, wall hangings, family trees, photo albums, postcards and a thousand other things. Feel free to experiment and set your imagination free. Clean the fabric with a washing powder free of phosphates and sodium before you start to make sure starch and conditioners are removed. Avoid washing your cyanotype creations using washing powder containing phosphates: they will fade to pale yellow.

Materials to experiment with

Try coating and printing on fabrics:

- Cotton poplin
- Silk (which gives the image a nice sheen)
- Raw silk
- Twill (a thick type of cotton)
- Linen
- Viscose / rayon
- Muslin, used very thin it can be layered or sandwiched together

"Baby Waltz" was printed on manila paper (top) a towel (above) and silk (right).

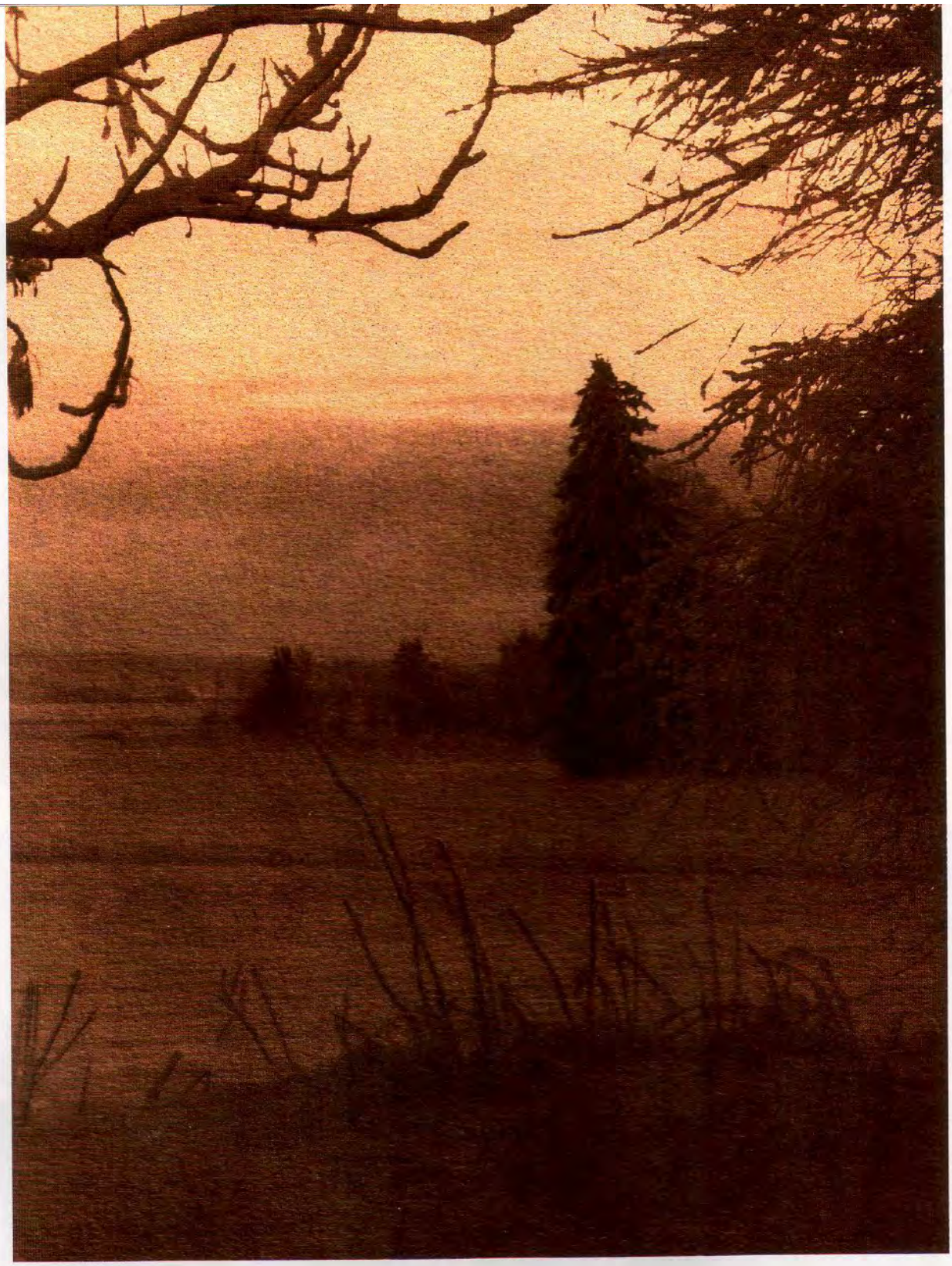
Colored material

Blue is just one color in the spectrum, and you may want your prints in other colors. Toning the material or printing on a colored material can achieve various blends.

Printing on red fabric will give you a purple and red print instead of blue and white. A turquoise fabric will give you a turquoise print on dark blue. Experiment with different colored material - it's fun! Don't forget to wash the fabric before you start.

A light blue on dark blue print can also be achieved by not using the coated material within a day, but letting it age for a few months.

"Baby Waltz" was printed on eight different colored fabrics, all 100% cotton, to illustrate how different color variations can be achieved without toning the material.



"Winter on the Nerike plains" by Malin Fabbri ©
This picture was taken on a cold winter morning over the fields. The sun was just struggling to rise, casting a faint light over the landscape. The image was captured using a Nikon digital camera, then a digital negative produced using Photoshop. It was printed on transparency film. A textured paper - Canson aquarelle paper - was coated using a Japanese hake brush and the classic cyanotype formula, and the print made the following summer under the sun with an exposure time of 25 minutes. The print was bleached using a solution of baking soda, not completely removing all the blue, and then toned in tannic acid.

Toning cyanotypes

Cyanotypes can be toned in different colors, but most commonly brown. Professional toners, or simpler 'kitchen chemistry' can be used. Toning is a two step process. First, the blue color has to be removed, then the print can be toned.

Chemistry for bleaching

To bleach the print, you can use any of these products - they may have different names in different countries:

- Baking soda (1% solution)
- Washing soda (1% solution)
- Sodium carbonate
- Ammonium hydroxide (5-10% solution)
- Hydrogen peroxide
- Potassium hydroxide
- Tri-sodium phosphate (TSP)
- Chlorine bleach
- Soap with phosphates

Bleaching the print

There are many ways to remove the blue color from the print. Safe kitchen chemistry such as baking soda can be used, or stronger solutions such as tri-sodium phosphate (TSP) and chlorine bleach. Industry chemicals like ammonium hydroxide are also an option.

Removing the blue

To remove the blue from the print - whether you choose the kitchen chemistry option or a harder chemistry - pour your solution in a tray, big enough to submerge the print without bending it. Photographic darkroom trays are great to work with, otherwise a baking tray that is big enough could suffice.

Wearing gloves, dip the print in the solution. In a strong bleaching solution, the blue disappears quite quickly. In a weaker one it may take a few minutes. Once the blue is removed, retrieve it from the bath and rinse the print well in water. Make sure you remove all of the bleaching solution. There is no need to dry the print. Your print is now ready to tone.

"Winter tree" was bleached in a solution of baking soda and water until the blue was removed and only yellow was left.

Soda safety

Baking soda is also known as sodium bicarbonate, sodium hydrogen carbonate, or bicarbonate of soda. It's chemical formula is ($NaHCO_3$). It's safe but can cause irritation if you inhale it or get it in your eyes.

Washing soda, also known as sodium carbonate or soda ash, is a water softener. It is a sodium salt of carbonic acid and the chemical formula is Na_2CO_3. Washing soda should not be eaten or inhaled and is an irritant.

"Grass" by Peter Wiklund ©
"Grass" was taken with a home-made pinhole camera. Peter used an old bellows-camera, and replaced the lens and bellows with a cardboard pinhole-plate. The camera has an extremely short focal length, approximately 15 mm, and since Peter uses 6x6 cm negatives on 120-rolls of film, there is a special kind of fisheye-effect on these images. The camera was placed directly on the ground during the exposure, which lasted somewhere between five and thirty seconds. The photograph was then scanned in. A digital negative was made and printed out on Pictorico transparency film. The film was exposed for 8 minutes using a UV light and the classic cyanotype process. The print was then bleached in baking soda and toned with tea for around one hour.

Different toning methods

Toning

The most common way to tone a cyanotype is by using tannic acid. The first step is to remove the blue color - described previously. The tannic acid will tone the yellow areas of the print brown. As you probably know, too much tannic acid in the form of tea will stain your teeth brown and this is what will happen to the print. However, like with your white teeth, it will also darken the highlights of your image somewhat. You can buy tannic acid from a chemical supplier, or get food grade tannic acid from a brewery supply store – cheaply and in small amounts. Or, simply use what you have in the kitchen - tea.

Chemistry for toning

For toning your print brown:

- Tea
- Coffee
- Oak bark
- Tannic acid (from brewery supply stores)

Using tea

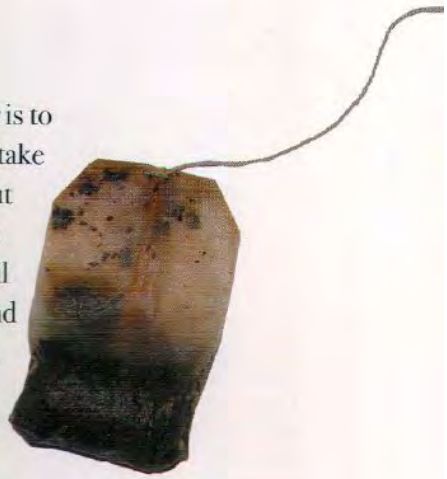
Tea will give the image a sepia toned, brownish look. Bags of cheap black tea are best - they contain more tannin. Avoid green teas or herbal teas all together.

Brew enough tea to make two very strong large cups, use 10 teabags. Let them brew for at least quarter of an hour, but there is no harm in leaving them brewing for longer.

Using coffe

The same procedure as for tea applies.

Using oak bark



A variation on "natural" toning is to use bark from an oak tree. Just take care not to damage the tree! Cut the bark and put it in an old pot – not one used for cooking. Boil the bark for an hour, strain it and let the solution cool before you use it. Pour the solution into a tray and rock the print back and forth in the tray until the yellow areas turn brown. Rinse the print and dry it. If the print is too brown, the solution is too strong and needs to be diluted with water.

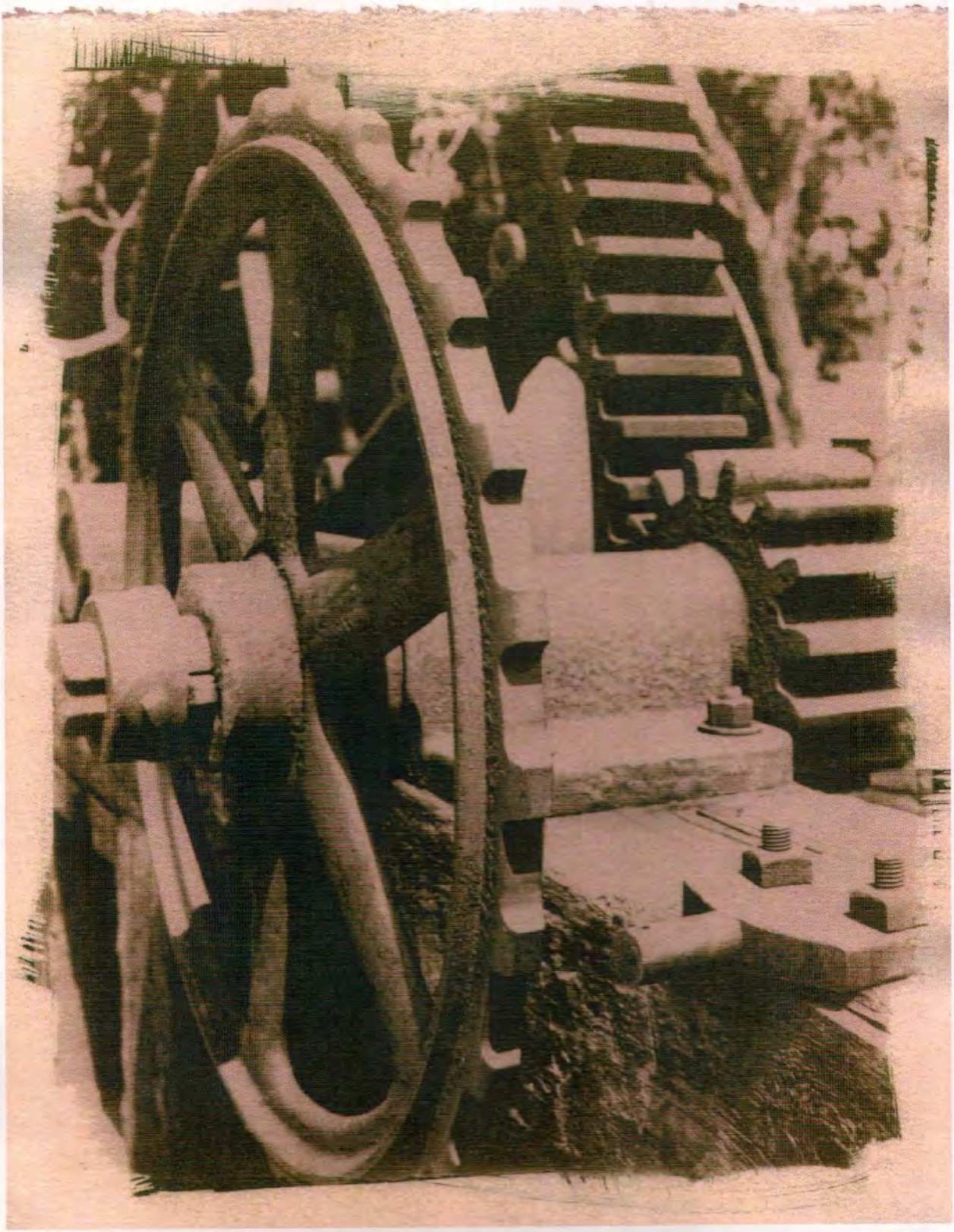
Toning in tannic acid

A more scientific way of toning a cyanotype is to use two solutions, one of ammonia for bleaching and one of tannic acid for toning.

The recipes

Solution A: 10 ml of ammonia is mixed with 1000 ml of water

Solution B: 40 grams of tannic acid is mixed with 1000 ml of water



"Gears" by Gustavo Castilla ©
The original negative is a 6x7 cm. It was scanned to a 8x10 size and printed on overhead transparency film. First an Ammonium Ferric Oxalate solution was used to coat Somerset paper. The paper was exposed for 15 minutes under bright sun. The print was developed and rinsed under running water. It was then bleached with a baking soda solution until the blue shifted to a light purple. The toning was done with coffee and tannic acid and laid face up for about 4 hours in the solution. To speed up the process hot coffee was added to the tannic solution.
More of Gustavo's work can be seen on www.AlternativePhotography.com/artists/gustavo_castilla.html

"Winter tree" to the left was toned in a solution of strong black tea for about two hours, until the yellow turned brown and the highlights turned golden.

Toning the cyanotype

Choosing tea, coffee or tannic acid, the working method of toning is the same. Start by pouring the toning solution into a tray big enough to submerge the print. Rock the print back and forth in the tray until the yellow areas turn brown. Leaving the print in longer will result in a darker shade of brown, but your highlights may also become stained to a light brown shade. Using a weak solution, the toning may take a couple of hours. Once the print has taken on the desired color, fish the print out of the tray, rinse the print and dry it.

Toning a cyanotype with tea, coffee, bark or tannic acid is not toning in the real sense, but actually a staining of the print. Toned fabric that is washed repeatedly may therefore fade after a couple of washes.

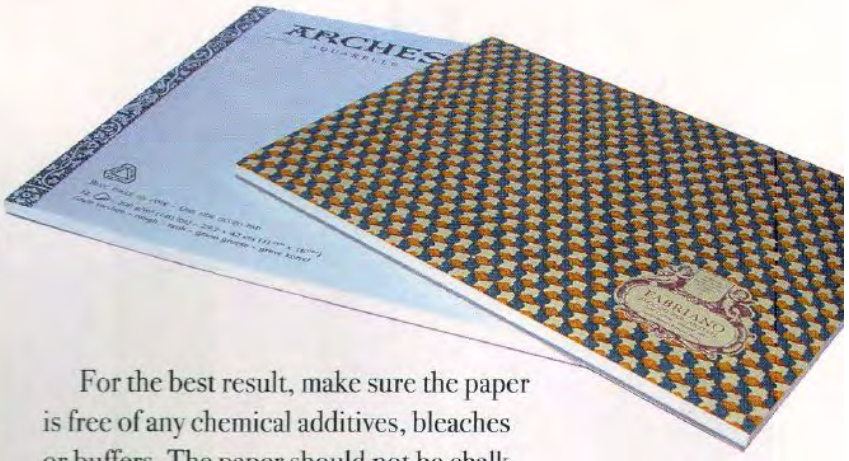
Shades of toning

Starting with a light blue print, after bleaching the yellow may be a faint yellow. A dark blue print may bleach to a richer yellow. This will also be reflected in the toning. After toning, the light print will be a light brown and the dark print will have a richer brown color. To achieve a very dark print you may also want to try not bleaching the print fully, but leaving some blue in the shadows before toning it.

Starting with a light blue print will result in a lighter brown print.

"Turret and Twister" by Nan Wollman ©
Nan's prints are abstracted from bones, plants, and rocks. With bleaching and toning she reworks and reprints the paper for a cohesive idea. The paper was coated in daylight, dried in a closet. Film and objects were placed on the paper and left outside in the sun all day to print.
When creating "Turret and Twister", Nan brushed the chemistry of the spiral elements first, and printed and processed the print. When it was dry, she brushed in the spike element and went through the whole process again. Because water where she works is heavily chlorinated, she uses a filter, but the water still bleaches out the chemistry, especially with long wash times. That is partly why the left spiral is so light. The right spiral is yellowish because it was darker than desired after the first run, and Nan bleached it out to bring out more details. The center element was not manipulated. The image was printed on Rives BFK paper using a contact frame and the original cyanotype process. More of Nan's work can be seen on www.AlternativePhotography.com/artists/nan_wollman.html

Papers



The same rules apply for printing on paper as for fabrics. Natural fibres work best, such as cotton rag papers, or papers free from chemicals.

When looking for a paper to use there are some characteristics to consider. Do you want a smooth paper that shows more details, or a more textured one, where the print may not come out as sharp? Take a look in your local art supply store to see what they have and get a feel for the textures and thicknesses available. Handmade cotton rag paper - if you can get hold of it - is also a really nice paper to try.

Paper choices

Manufactured papers that are worth trying are:

- Arches Aquarelle
- Arches Platine
- Arches hot press watercolor
- Buxton
- Cranes AS8111
- Cranes Crest Parchment
- Cranes Parchmont Wove
- Cranes platinotype
- Fabriano 5
- Fabriano Artistico
- Hahnemühle
- Rives Lightweight
- Rives BFK
- Stonehenge HP

For the best result, make sure the paper is free of any chemical additives, bleaches or buffers. The paper should not be chalk buffered. Hot pressed papers are preferred to cold pressed papers.

If you want to experiment, you can also try different watercolor papers, or even cheap brown wrapping paper (the light brown one found in post offices). The chemicals are inexpensive and the process lends itself to experimenting - have fun!

For fine art printing, it is worth paying a bit of extra attention to the paper used. The British chemist and photographer Dr. Mike Ware has specified a paper with characteristics for especially taylored for alternative processes like the cyanotype. The paper is made by Ruscombe Mill and is called Buxton paper. It is somewhat pricy and available in two weights of 160 gm and 240 gm.

Toxicity

Potassium ferricyanide

The "cyanide" part of the name suggests the chemical is very toxic, but it is relatively safe. It can, however, release a hydrogen cyanide gas that is highly toxic if the Potassium ferricyanide is stored or mixed with an acid solution. An acid solution is not used in the cyanotype process, so if using the chemicals as instructed, the process is safe. Just beware of how you store and dispose of the Potassium ferricyanide. The chemical formula for Potassium ferricyanide is ($K_3[Fe(CN)_6]$) and it has a density of 1.89 g/cm². The chemical is also known as Red prussiate of potash, Red prussiate, Prussian red and Potassium hexacyanoferrate(III). The chemical is in the shape of red crystals or powder.

Ferric ammonium citrate

Ferric ammonium citrate comes in two colors, green and brown. Both can be used for the cyanotype process, although the green is more popular and commonly considered "better". The chemical is slightly toxic. Prolonged contact with the chemical can cause skin irritations. It is also an irritant to eyes and respiratory system – use a dust mask as well as gloves when handling chemicals. Store the chemicals in a sealed container in a dark and dry area. Ferric ammonium citrate is also known as Iron ammonium citrate, Ammonium iron(III) citrate and Ammonium ferric citrate.

Safety and storing

You can use containers or utensils from the kitchen when making cyanotypes, but once the items have been used for chemicals, do NOT put them back into the kitchen and do NOT use them for food again. Mark containers very clearly and keep them in a separate cupboard, well out of reach of children. Do NOT put containers or chemicals in a cupboard where you store food or drink.

Store left over solution in clearly marked containers or bottles. Use plastic or glass containers, not metal. Metal will react with the iron salts in the solution. The chemicals are light sensitive and should be stored in the dark or in light-proofed containers.

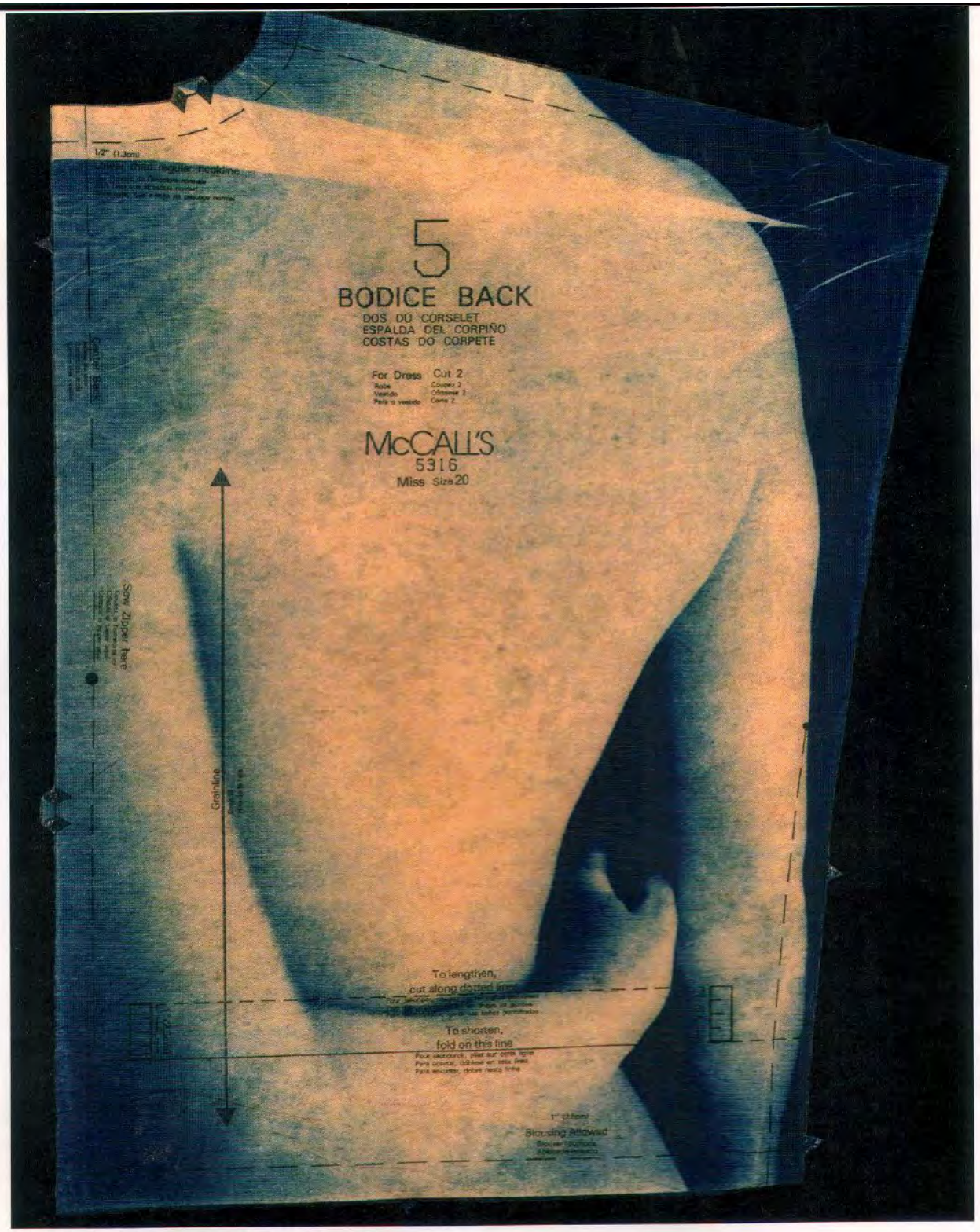
The solutions can keep for a few months, but it is wise to test them before using them again after storage. Discard any moldy solution. If the solution has changed color – to dark green – the prints may come out dull and you are better off mixing a new batch.

When handling or mixing chemicals, wear a mask and rubber gloves, not only for safety, but because the chemicals may stain your skin. Cover work surfaces with newspaper.

Disposal of chemicals

Although neither Potassium ferricyanide nor Ferric ammonium citrate are particularly toxic, it is always good to dispose of chemicals in a correct manner. Don't take any unnecessary risks.

"Miami Beach" by Jill Enfield ©
"Miami Beach" was made with a Diana camera, an enlarged negative was made from the original 2 $^{1}/_{4}$ inch negative with Bergger film in the darkroom. The photograph was then printed using the classic cyanotype process.



"Bodice back 5" by Francis Baker ©

"Bodice back 5" and the pattern series, deals with issues stemming from our corporeal existence. Physical image, the affects of age, feelings of wholeness, isolation and individuality are weighed against the backdrop of the body's transitory nature. The patterned substrate alludes to the many times we try to make ourselves fit the norm. The feel and look of the tissue paper further illustrates the body's fragile nature.

The original photograph was taken using a medium format camera, it was made into a 4x5 inch inter-positive and then a final sized enlarged negative. Francis printed the image using a 4x5 foot UV light source, specifically constructed for alternative process printing. The tissue paper was coated with the classic cyanotype formula using a foam brush, brushing again after about 10 minutes of drying to avoid pooling. The printing time was around 30 minutes. The tricky part with this series was working with the tissue paper throughout the wetting and drying and washing phases. Patience and careful handling was the key.

More of Francis' work can be seen on www.AlternativePhotography.com/artists/francis_baker.html

Washing fabrics and cloth

If you have printed your cyanotype on a T-shirt, curtain, quilt or something else that requires washing, bear in mind that you cannot use any soap powder or detergent containing phosphates or sodium on blueprinted fabrics. It is best to clean them by hand washing in water only, or use very mild hand washing soaps. Dry cleaning may also work, but to be on the safe side, try dry cleaning a test piece of the material first. Ironing should be quite safe too. By washing your cyanotype frequently, its lifespan can be shortened.

Last but not least... a cyanotype from Farah Mahbub, a teacher of photography in Pakistan:

"Lay Me Down Two" by Farah Mahbub ©
According to Farah, sometimes the best images happen when only half the things go as planned. To get 8x10 inch sheets of Kodak litho film in Pakistan was not easy. Farah decided to make 30 images with 30 sheets of good quality enlarged negatives of her reversal slide film images and her black and white negatives.
The leftover tests of enlarged negatives had sections and effects in them that Farah wanted to infuse into the original images. Straight images from straight negatives did nothing for Farah's aesthetic emotional side, hence the multiple quantities of enlarged negatives used in the "Azure" Cyanotype image series.
"Lay Me Down Two" is made using a contact frame and the original cyanotype process.
More of Farah's work can be seen on www.AlternativePhotography.com/artists/farah_mahbub.html

References

Weights, measures and conversions

If you don't have a scale, you can use tablespoons and teaspoons to measure out the right amount of chemicals. Below is an APPROXIMATE conversion of weights and measures of the chemicals needed in the recipe.

Ferric Ammonium citrate (green)

25 grams = 30 ml. =
2 tablespoons = 6 teaspoons

Potassium ferricyanide

10 grams = 9,7 ml. =
2/3 tablespoon = 2 teaspoons

Fluid measurements

1 tablespoon = 15 ml.
1 teaspoon = 5 ml.
1 ml. = 0.0338 fluid ounces
1 fluid ounce = 29.57353 ml.
Milliliter to fluid ounces: divide by 29.5735

Weight measurements

1 ounce = 28.3495 grams
1 gram = 0,03527 ounces
Gram to ounces: divide by 28.3495

Note that some British measures are not equivalent to US measures with the same name. These measures are US measures.

Ready made kits

Photographers' Formulary in the US and Silverprint and Fotospeed in the UK carry ready made kits. The kits contain chemicals for making solutions and instructions. Fotospeed's kit comes with samples of paper and a coating rod. The Photographers' Formulary also sells ready mixed solutions separately.

Fotospeed
Unit 6b
Park Lane Industrial Estate
Corsham
Wiltshire SN13 9LG
Tel: +44 (0)1249 714555
Email: info@fotospeed.com
Website: www.fotospeed.com

Photographers' Formulary Inc
PO Box 950, Condon, MT 59826
Tel: +1 406 754-2891 or (800) 922 5255 - within U.S.A. only
Email: formulary@blackfoot.net
Website: www.photoformulary.com

Pre-coated papers and fabrics

For those in a real rush, there are pre-coated papers available. It is less flexible, but also a very convenient way to a quick start. High quality supplies are available from Blue Sunprints and Blueprints on Fabric.

Blue Sunprints
23630 107th Avenue S.W.
Vashon Island
WA. 98070
Tel: 1-206-463-4028
Email: info@bluesunprints.com
Website: www.bluesunprints.com
Supply: Pre-treated cyanotype watercolor paper, cotton sheeting and silk by the yard. All materials are non-toxic and archival. Pre-cut cotton squares available in small packs for teaching all ages. Custom sizes available.

Blueprints On Fabric
20504 81st. Ave. S.W.
Vashon Island
WA 98070
Tel: (800) 631-3369 - within U.S.A. only
Email: linda@blueprintsonfabric.com
Website: www.blueprintsonfabric.com
Supply: Pre-coated 100% natural fiber cotton and silk fabric for cyanotype, pieces and yardage, T-shirts and scarves. Pre-washed, hand-treated and individually packaged in a UV protective bag. Custom orders are a specialty. Also cyanotype chemicals.

Solargraphics
PO Box 7091P
Berkeley
California 94707
Tel: +1 415 525 1776
Supply: Stock cyanotype and other chemicals and ready made kits.

Further reading

Below is a list of books with more information on cyanotypes. Some books listed here are more generally written about alternative photographic processes, but contain chapters on the cyanotype process. It is by far not a complete list of books on alternative processes. Some of the titles are unfortunatley out of print, but you may be able to get hold of these on Powells.com or Amazon.com - it's definitely worth trying!

Alternative photographic processes: A resource manual for the artist, photographer, craftsperson
Kent Wade (1978)
Morgan&Morgan.

Blueprints on Fabric: Innovative Uses for Cyanotype
Barbara Hewitt (1995)
Interweave press. Printing cyanotypes on fabrics, such as T-shirts.

The Book of Alternative Photographic Processes
Christopher James (2001)
Thomson Delmar Learning

Cyanotype: The history, science and art of photographic printing in Prussian blue
Mike Ware (1999)
The Science Museum and the National Museum of Photography Film and Television. Extensive book on cyanotypes, covering everything from the symbolism of blue to the molecular structure of the chemicals. Very technical and well researched and will take you to the next level of cyanotyping. A must have!

A Guide to Early Photographic Processes
Brian Coe and Mark Haworth-Booth (1983)
Victoria & Albert Museum.

Handbook of Alternative Photographic Processes
Jan Arnow (1982)
Van Nostrand Reinhold.

Historic Photographic Processes
Richard Farber (1998)
A Guide to Creating Handmade Photographic Images, Allworth Press.

The keepers of light - A history & working guide to early photographic processes
William Crawford (1979)
Morgan & Morgan

Sun Gardens - Victorian photograms by Anna Atkins
Larry J. Schaaf
Phaidon Press Ltd.
Reproductions from the first photographic book ever published. Bibliography of Anna Atkins and photograms from the original book.

Internet resources

AlternativePhotography.com
A resource for all alternative processes. Includes extensive technical information on cyanotypes, artists' galleries and a free newsletter.
www.AlternativePhotography.com

Dan Burkholder's homepage
Information on digital negatives and photoshop tutorials for sale.
www.danburkholder.com

Mike Ware's homepage
Plenty of articles on iron based printing and preservation.
www.mikeware.co.uk

Photographers' Formulary Newsletter
A newsletter with workshops, artists' work, and articles. Subscribe free.
www.photoformulary.com

Precision Digital Negatives
Mark Nelson's invention of a digital system for making digital negatives - for sale on the site.
www.precisiondigitalnegatives.com

The-alt-photo-process mailing list:
The alt-photo-process-l@usask.ca mailing list is usually referred to as just "the list" – a brilliant email list for sharing information that has been going for years.
Subscribe by sending an email to:
alt-photo-process-request@usask.ca
with the message: subscribe alt-photo-process-l
Please note the last character is the letter "L" not the number "one".
You will get A LOT of emails every day and information on how to unsubscribe will be posted to you. You can also search the archives.

Unblinking eye
Articles on cyanotypes and other alternative processes.
www.unblinkingeye.com

Further copies

Further copies of this book can be bought at www.AlternativePhotography.com/BlueprintToCyanotypes.html

The cyanotype is often the first alternative process that people try. It's relatively easy and safe enough to nurture a child's interest in photography. It can also be seen as a gateway to further exploration of historic photographic methods. In addition, it gives experienced photographers and artists a great excuse to take their eyes off the computer screen and get their hands dirty.

Blueprint to cyanotypes is all you will need to get started with cyanotypes. It offers the beginner a step-by-step guide, from choosing material to making the final print. It is full of information and tips. Even the experienced cyanotyper may learn a thing or two.

Blueprint to cyanotypes is published by AlternativePhotography.com - a website and information center dedicated to alternative photographic processes.

"A very clear and well written book on cyanotypes. It's easy to follow for the beginner and is an inspiration for the more experienced photographer. I highly recommend it!"

- Spike McGee
Photography teacher and artist

ISBN 978-1-4116-9838-3
90000
9 781411 698383