

Introduction:

Though he was trained as a painter, Gustave Le Gray made his mark in the emerging medium of photography, the waxed paper negative process was created in 1851. He was a founding member of the first photogenic society in the world, it was called the "Societe Heliographique." Le Gray was the first person to have the revolutionary idea of saturating the paper in wax before sensitizing. He presented his idea in front of the French Academie of Sciences in Paris. They concluded that the LeGrays method was particularly fantastic for its ability to catch the detail. His steps were simple and his method of photography became popular.

1. The high-quality paper is impregnated with warm wax.
2. The waxed paper is "salted" or "iodized".
3. The prepared paper is stored until ready for total sensitization.
4. The paper is sensitized with silver nitrate. A binding medium was used by Le Gray and his followers in this procedure: "whey", albumen, isinglass, or rice water act as a binder between the waxed surface and the chemistry.
5. The sensitized paper is exposed in the camera to UV light.
6. The exposed negative is developed in gallic acid and fixed.

Beeswax was a familiar and well-known material to 19th-century photographers and was used for waxing paper negatives. In LeGray's time, chemicals were available in different grades of purity, as they are today. The photographic manuals always encouraged the use of the "purest possible". The color of the image in paper negatives ranges from red and yellow tones to brown and neutral tones. This color variation is due in part to differences in the particle size of the final image silver, to the specific chemical formulations and to the paper employed as primary support. Images made from the Calotype and Plain Paper Process are slightly diffuse with softer details, while the waxed paper negatives are surprisingly sharp, due to the initial reduction of light scattering within the fibers by the transparentizing agent. Many of the waxed paper negatives examined appeared flat grey under normally reflected illumination.

While learning this process, we had the privilege of having copies of original texts, many resources for research, and an experienced teacher.

Waxing:

We start by cutting our paper to fit the frames we have for the camera, around 7 by 9 inches. We then immerse that paper in melted beeswax for about one minute, making sure it is coated well. After that minute we pull out the paper and put it between 2 pieces of blotting paper. With an iron on high heat, no steam, begin to iron the paper between the blotting papers until you can see no shine on the paper. This may take a few minutes and it helps to flip the blotting papers over, rearrange the paper and press firmly while ironing. The wax will have set into the paper at that point and you may store this for as long as needed.

Iodizing:

Next, we must iodize the paper. To do so, we must take 7 ounces of rice and 7 liters of distilled water and “bruise” the rice, cooking until the water is cloudy and the rice is still somewhat firm. Filter the rice out of the water and keep the rice water for further use. It is important to have an abundance of this rice water because the paper needs to be submerged in it. 1 liter of rice water will be mixed with 45g of Lactose and 15g of Potassium Iodide. Then the waxed paper should be submerged in the iodizer for two hours and then hung to dry.

Sensitizing:

The next step is sensitizing. This whole process must take place in the dark, using only red lights. To start, add 300ml of Distilled water, 22g of silver nitrate and 24ml of acetic acid. There is also the option to add bone black (8g), if you are adding bone black, shake in an amber bottle and leave overnight. Make sure to filter several times the next day. Mix all the materials together, and place the sheet into the sensitizer for 5 minutes. After, we will put the sheet into two baths of rinse distilled water for 5 minutes each. Once it has gone through all three baths, blot dry and place it into the holder.

Exposure:

Once it has dried, it may be placed in the frame, with a sheet of glass over it. The frame slides into the camera and the light on the subject of the photo should be tested

with a UV meter. Depending on the light available, exposures may range from 1.5-4 minutes in direct light. Once exposure time is over, immediately close the shutter so overexposure does not occur.

Development:

Once you have exposed the paper to light, the next step is to develop the photo. You will need to start with 20ml of gallic acid stock solution, 5ml Aceto nitrate, and 480ml of distilled water. To make the stock solution, start with 20g of gallic acid and 100mL of ethanol. Place the beaker in a water bath and stir until it is dissolved. Filter into an amber bottle. To make the Aceto nitrate, simply combine 5.6g of silver nitrate, 50mL of distilled water and 9.7 Glacial acetic acids. Make sure to store in an amber bottle.

To start the developing process, filter gallic acid and add to the distilled water. After 15 minutes, the Aceto nitrate which is also filtered should be added to the developer. When adding the Aceto nitrate, have someone hold the paper while another adds the Aceto and mixes it together. Then place the paper back into the pan, and let develop. Developing usually will take around an hour or two, however, times will vary depending on the exposure time and how dark you would like your photo to be.

Fixing:

Fixing is an important process, as it is what makes the photo stay on the paper. There are four steps to fixing, two baths of fixer, one bath of hypo clear and one of distilled rinse water. Boil distilled water to help dissolve the fixer (Sodium Thiosulfate) and the hypo clear (Sodium Sulfite). Add 250mL of the boiling distilled water, and top off with 250mL of room temperature distilled water. Place sheet in each bath, then let sit in the rinse water for around an hour. Take out after an hour, and place on blotting paper to air dry.

Salt Printing

After your negative is done, we can finally print with it! There are three steps to salt printing: salting the paper, exposing to UV light, and fixing the photo.

Salting the Paper - there are two types of gelatin salting to choose from. One will yield a red purple tint, while the other will result in a blue purple tint. We used the red purple

tinted gelatin process. However, the most important thing to remember is to keep the gelatin warm at all times. Start by soaking 8g of gelatin in room temperature for 15 to 20 minutes in 500mL of distilled water. After the gelatin “blooms”, heat the remaining 500mL of distilled water to 100F. The easiest way to maintain this temperature is to create a double boiler where a larger container is holding the hot water, while the beaker is placed in that container. When the gelatin and water are at 100F, add 18g of sodium citrate and 20g of ammonium chloride. Gently place paper, one sheet at a time into the gelatin solution. Soak for 3 to 5 minutes, then remove each sheet and hang on clothespins to dry. However, after a minute flip the paper and hang from the other side. This will ensure even coverage of the gelatin all over the paper.

Exposure

We start by exposing the light to indirect sunlight. The indirect sunlight will help with details in the photo. After getting the photo to a place that feels satisfactory, place in direct sunlight. This direct light will help with the overall picture. However, when exposing, make sure to get it darker than you would originally like it to be, as during the fixing process the photo can lighten. Using tanning lamps also can work if it is a cloudy day or you do not have access to other forms of UV light.

The next step after the paper is salted is to add a layer or two of silver nitrate and citric acid solution. Make sure to float the smooth side of the paper, which can be found looking at the texture of the paper. We recommend floating the salted paper, which means to place the paper in a bath and let it soak for a certain amount of time. The easiest way to prevent silver from getting on the wrong side is to fold up all the sides. We floated out paper for 60 seconds, however, it can be recommended to float for 15-30 seconds. The paper should be even covered, and then hung to dry. The folded edges can be trimmed off once the paper is dry.

Fixing

After exposing the photo, we must fix it. There are 5 steps to fixing, a salt bath, distilled water rinse, fixer, hypo clear and another distilled water rinse. The salt bath will be made from 10g citric acid, 30g of kosher salt and 1000mL of distilled water. The paper will soak for 5 minutes, and make sure to agitate every minute or so. Then, place the print into a rinse water for 15-20 minutes, and again, agitate and add fresh water to the tray. At this stage, if you want to tone the print to change the color you are able to. Fixer is the next stage, which is composed of 1000mL of distilled water, 100g of Sodium Thiosulfate and 2g of Sodium bicarbonate. This should only stay in the toner for a minute. After the fixer, the last step is hypoclear. This will be made of 10g of sodium sulfite and 1000mL of distilled water. Leave the print in here for only 3-5 minutes, then place in a rinse tray and leave for an hour. After the print has been rinsed, lay out to dry.

Cleaning and Contamination

Keeping your space clean during this photographic process is vital. Contamination can ruin a photo, or affect the results. To prevent this from happening, we use several different procedures to make sure that our space is clean. First, we never touch anything without gloves on. This makes sure that anything that could be on your hands will not be transferred. Wearing gloves and an apron will make sure that you will be protected from the chemicals, which can stain skin and clothing. Secondly, when we clean our dishes, we use a certain procedure. We start by washing the dish in tap water, then we will use rubbing alcohol to make sure nothing else is on it. After the rubbing alcohol, we rinse again in tap water at least 5 times. Once the dish has nothing left on it, and no longer smells like alcohol, we will do one rinse of distilled water. After this whole washing process is done, you can either air dry or dry with paper towels. We prefer to air dry our dishes.

A Comprehensive Materials List

Chemicals

- Potassium Iodide
- Silver Nitrate
- Acetic Acid
- Gallic Acid
- Aceto Nitrate
- Sodium Thiosulfate
- Sodium Sulfite

Ingredients

- Lactose
- Distilled Water
- Citric Acid
- Kosher Salt
- Rice
- Beeswax

Tools/other materials

- An iron

- Hotplate to melt beeswax in
- Red Lights
- Pot to make rice water in and a hot place
- An camera
- Filter Paper
- A scale
- Holders for sun exposure
- Optional: Tanning Lamp

Dishes

- Beaker
- Graduated Cylinder
- Pyrex Dishes (or something similar)
- Amber Bottles
- Filters

Daffner, Lee Anne. "Examination and Investigation of 19th Century Paper Negatives." Topics in Photographic Preservation. Accessed March 27, 2020.

http://resources.culturalheritage.org/pmgtopics/1995-volume-six/06_01_Daffner.html.