SP.747 Final Project
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"The cyanotype remains available to artists precisely because it embodies this contradiction between information and expression, between the documentary and the metaphoric, unpretentious industry and unadulterated art that lies at the heart of photography."

Lyle Rexler,
Photography's Antiquarian Avant-Garde [1]

Blue and White

For my final project I decided to explore an alternative printing process – cyanotyping. The initial idea for the project was to create a series of pictures of campus buildings combined in Photoshop with human portraits. However my passion for darkroom work prevailed and I chose to work on cyanotypes.

Cyanotype printing was invented by John Herschel in the 1842[2] as a cheap, simple and non-toxic alternative printing method. Sir Herschel was looking for a method to copy his astronomy notes and the cyanotypes were later used for copying architectural plans (hence the term "blueprint"). The first book using cyanotypes as illustrations was published only one year later, in 1843, by the botanist Anna Atkins[3]. The book contained "shadowgraphs" of ferns, and it was the first book in the history to use photographic images. In the era of high-resolution digital cameras, cyanotypes are perceived as an artistic alternative photography method.

The chemistry of the process is very simple – the ammonium iron (III) citrate reacts with potassium ferricyanide in UV light to produce a deep-blue color, also called Prussian blue. The sensitizer chemicals that do not react are water soluble and are washed out in a 5-10 minute flowing water bath, whereas the blue compound becomes linked to the cellulose molecules and remains in the paper (although some of it will be inevitably washed). The cyanotype recipe[4] is quite simple:

- Ammonium iron(III) citrate ('green' variety) (25g)
- Potassium ferricyanide $K_3[Fe(CN)_6]$ (10g)
- Distilled water (200mL)

One can create the ammonium iron citrate solution separately with 100mL of water and the potassium ferricyanide solution separately with 100mL of water and mix equal quantities of the

[1] http://www.geocities.com/edwardaites/galcyanthn1.html
[2] http://www.geocities.com/edwardaites/about_cyan.html
[3] http://www.alternativephotography.com/articles/art007.html
[4] http://www.ephotozine.com/techniques/viewtechnique.cfm?recid=155

two before sensitizing the paper. The two solutions can be stored in dark for extended periods of time (weeks to months). The sensitizer solution can be spread on the paper by wither using a glass rod or a brush. Depending on the paper, 2-4 mL of sensitizing solution may be needed for an 8in by 10in sheet.

The first stage of the project was to test a variety of papers of different density, texture, and color. In general porous paper absorbs the sensitizer better and prevents the Prussian blue from washing away in the water bath. On the other hand, porous paper does not offer a high definition of details, but is good for close-up portraits or abstract images. I tested around 10 varieties of light colored paper and cards from Pearl arts store. The "Bubblegum Card" paper was the best for pictures with details; however it had the disadvantage of being pink, which lowered the overall contrast of the prints. Different papers modify the shade of color from very dark blue to light bleu and sometimes even dirty-green color. It is desirable to use a paper that was not intensely processed. The chemicals used for bleaching or coloring may interact with the sensitizing solution and change the color and contrast of the final print. I also attempted to print a cyanotype on a regular 100% cotton white T-shirt, but the Prussian blue was almost completely washed away in the bath. The only factor that limits the choice of paper for cyanotyping is that it must be kept in the water-bath for 5-10 minutes.

Because the cyan-sensitized paper is much less sensitive than silver-gelatin photographic paper, the choice of negatives for contact printing will affect the contrast and clarity of the image. I used Photoshop to create grayscale negatives from both color digital pictures and black and white 35mm prints. Photoshop also proved useful for contrast and intensity adjustments. The negatives for contact printing were printed on transparencies on the Epson-80 printer in the digital image processing laboratory in Edgerton Center.

The ammonium citrate and potassium ferricyanide are sensitive to UV light. The advantage of this is that one does not need to sensitize the paper in a darkroom. Tungsten lights are safe for exposures of 5-10 minutes (this is how much it takes to sensitize 5-10 8in by 10in sheets). It is recommended to avoid incandescent light sources because their spectra contain some UV. Contact printing must be done outside on a sunny day or in the light of a UV lamp. The visible daylight intensity and UV intensity vary significantly during the day, so it is recommended to do a preliminary test wedge print. The exposure times in the sunlight may vary from 1 minute to 15-20 minutes depending on the time of the year and the desired color intensity. A UV lamp offers a constant intensity, but exposure times can be up to one hour, depending on the source. I tested a UV lamp used for sterilizing a bio-lab bench, but it turned out to be too weak, therefore my final project became weather-dependent. Due to the extremely low cost of materials, it was more efficient to print the same picture with exposures of 4, 6, 8, and 10 minutes. Generally it is better to overexpose a cyanotype than to underexpose it. There is no scientific formula of success; the best results are reached by trial and error.

Although the SP.747 class is over, I plan to do a lot more cyanotyping on my own during the summer. Now that the technical difficulties have been solved, I could focus on the artistic side of blueprinting. That will include some abstract images, close-up portraits, pictures of buildings, water waves, geometric patterns and high contrast images. I hope to put together a webpage with an introductory course of cyanotyping with photos of the sensitizing and printing processes, as well as scanned images at different exposures and different after-treatment.