The Platinum/Palladium Process

OVERVIEW AND EXPECTATIONS

In the majority of the classes and workshops that I’ve taught over the years, “the platinum/palladium process” is the answer that surfaces first when I ask the question, “What process do you want to learn the most?” In this chapter you will learn how, and, as in previous chapters, I begin with a little history. Then you will learn the chemistry and sequence of the various stages to a finished print. This chapter gives you alternatives to traditional platinum/palladium chemistry and provides you with a simple sensitizer “drop chart” that is based on the type of negative you are working with, rather than the print you would like to make. I also provide the beginnings of a trouble-shooting list to assist in hunting down problems that may be showing up in your work. Finally, you’ll get some brief alternative ideas for combining platinum/palladium with other techniques such as Van Dyke and gum bichromate.

A LITTLE HISTORY

Like most refined non-silver and alternative photographic processes, the art of platinum/palladium printing was developed in pieces over time by a number of dedicated artists and scientists. In 1830, Ferdinand Gehlen recorded the action and effects of light on platinum chloride, noting that UV light would alter the color of platinum salts and cause the ferric salts to precipitate out into a ferrous state. At around the same time, Johann Wolfgang Dobereiner (1780–1849) observed the decomposition of ferric oxalate on exposure to UV light and scientifically defined its sensitivity. Dobereiner also recorded the light-sensitivity of platinum salts, manganic oxalates (containing manganese), and tincture of iodine. His scientific observations are relevant here in that they form a foundation on which many non-silver processes have been built.
Figure 9-1

Christopher James, Market, Cairo, Egypt, 1992

(Plastic camera platinum)

This image was made in an open-air Cairo market with a plastic camera (a modified Holga) while following this angel-like chicken on its way to a butcher. An internegative was generated on SO-132 film and used to make this platinum/palladium print.

(Courtesy of the author)
In 1831, Sir John Herschel noticed that when he acidified platinum salts with hydrochloric and nitric acids, mixed them into solution with calcium hydroxide, and then placed them in a dark environment, nothing at all happened. But when he exposed them to sunlight, a precipitate was formed. Robert Hunt (1807–1887), a Herschel contemporary, did some experiments in the early 1840s using platinum chloride on silver iodide coated papers. Later on he mixed platinum chloride with a solution of potassium cyanate that, on exposure to sunlight, yielded a faint latent image. He then placed the paper in a solution of mercury salts that gave him a lovely image, which, like most everyone else’s experiments, faded away over time, and which meant that it could not be considered a platinum print. Hunt is also remembered for his discovery of ferrous sulphate as a developing agent (1844), his work on the influence of the spectrum on light-sensitive materials, and for being one the founders of the Royal Photographic Society.

In 1859, C. J. Burnett was the first to demonstrate a semi-controlled adaptation of these previous experiments using sodium chloroplatinate. His platinum-based experiments were not, according to Burnett, entirely successful. However, his prints with palladium salts were, and Burnett happily got to exhibit his work—the first palladium prints. Then in the early 1870s, William Willis (1841–1923), ardently looking for a way to make a more stable print, conducted an involved series of experiments using platinum salts. Willis was successful in reducing the ferrous salts, following UV exposure, to a more stable metallic platinum by incorporating a potassium oxalate developer. He was granted several patents for his research and founded the first commercial platinum paper enterprise, the Platinotype Company.

In the late 1880s, Captain Giuseppe Pizzighelli (1849–1912) and Baron Arthur Von Hübl (1852–1932) expanded and modified Willis’s work. They created an emulsion that incorporated sodium ferric oxalate into the sensitizer, humidifying the paper prior to exposure, and

Figure 9–2
Frederick Evans (1853–1943), Portrait of Aubrey Beardsley, 1895
(Platinum print)
Frederick Evans was a photographic purist; some would say a zealot, who scorned any artist who strayed from the truth and essence of the medium. His subject in this 1895 platinum print was Aubrey Beardsley (1872–1898), a self-taught illustrator influenced by Japanese woodcuts, the silhouette simplicity of Greek vase painting, and the flamboyance of French Rococo. Beardsley enjoyed a brief career with his erotically decorative, monochromatic, illustrations and died of tuberculosis at the age of 27. The confluence of personalities between Beardsley and Evans is why this image has always been one of my favorites.  
(Courtesy of the George Eastman House, Rochester, NY)
eliminating the need for the potassium oxalate liquid development. During the process, the platinum salt was reduced to the ferrous state and converted into a metallic state during the exposure. Following a brief water clearing bath, the image was immersed in an acidic solution (hydrochloric acid) for clearing and then washed. The process was marketed as Dr. Jacoby’s Platinum Printing-Out-Process (POP). Can you see how these ideas are beginning to fit together?

Pizzighelli continued to experiment with other “double salt” formulas and discovered that with the addition

**Pictorialism**

Beginning with Hill and Adamson’s Calotypes of the members of the newly formed Free Church of Scotland (1843–1847), there have been photographers who approached the medium with more artistic intentions than those founded on practical science or curious discovery. The first scientist to officially make the break was Peter Henry Emerson (1856–1936) who, by virtue of his revisionistic views of art history and demonstrative ego, was able to spawn a movement in photography that led away from the virtues of science to the less-defined virtues of fine art.

Emerson made up a lot of rules for photography; centralized subject matter, sharp focus, natural settings, and candid posing, and in 1889 Emerson published his theories on artistic photography in a book entitled *Naturalistic Photography*. The following year, Emerson changed his mind about everything he had written due to Hurter and Driffield’s research (Chapter 6), and self-published a second book titled *The Death of Naturalistic Photography*. It was too late, however, because the influence of *Naturalistic Photography* had gripped the imaginations of many influential image makers and critics.

Shortly after Emerson’s first book, more than a few photographers began to think of themselves as pure artists and their respective efforts often mirrored the styles and ideas of Impressionist painters. Groups of photographers formed together to ensure that their voices would be respected and established “clubs” such as the Linked Ring Brotherhood (London, 1892) and the legendary Photo-Secession (New York, 1902) that achieved its strength through the personality of Alfred Steiglitz and his magazine, *Camera Work* (1903–1917). These groups were the strongest advocates for alternative and non-silver processes and the concept that it was appropriate for photographers to have hands as well as eyes.

Ironically, the rebellious nature of the pictorialists became pedantic with an assortment of inflexible “new rules” as to what a proper image should be, and the photo-secessionist movement underwent a transformation with a far more conservative and visual theology. This visual “religion” made a home for itself in camera clubs and generic competitions. In modern nomenclature, the word *pictorial* most often describes, positively or negatively, depending on who is speaking, a work of art that is “painterly,” handmade, romantic, trite, a cliché, and personal.

**Figure 9–3**

Gertrude Käsebier (1852–1934), *Blessed Art Thou Among Women*, 1900 (Platinum print)

Gertrude Käsebier was a prominent member of England’s The Linked Ring (its first American woman) and one of the primary influences in the Pictorialist movement. Steiglitz was a fan of hers, publishing her in *Camera Work* (1903–1917) and exhibiting her work in his 291 Gallery. Like the majority of the pictorialists, she was devoted to ideal, romantic, and nostalgic visions of life.

(Courtesy of the George Eastman House, Rochester, NY)
of either sodium ferric oxalate, potassium ferric oxalate, or ammonium ferric oxalate, he could alter the sensitivity and color of his print. Several years ago, Pizzighelli’s POP research was expanded and refined through the efforts of Dr. Michael Ware and Dr. Pradip Malde, who developed an ammonium method of printing by substituting Pizzaghelli’s potassium chloroplatinite with ammonium chloroplatinite. More recently, Dick Sullivan, with testing collaboration by Carl Weese, began working on all of the previously assembled POP data and developed a user-friendly, palladium-based process that he called the Ziatype, which is discussed in Chapter 10.

Beginning in the early 1900s, commercially produced platinum and palladium papers were available in Europe and the United States (even Kodak made them) and were very popular due to the beauty of their tonalities and permanence. The palladium process, which is essentially the same as platinum, with the principal exceptions of cost and color, was introduced during World War I. Hand-coating techniques were a nonissue because of the commercial availability of the papers, and the process became the way to make prints by both photographic artists and amateurs and stayed popular until the 1920s primarily due to the popularity of the “pictorialist” aesthetic.

With the advent of smaller format cameras, photography became a democratic reality, and social documentation, photojournalism, and work with commercial intentions partially replaced the classical pictorialism, which was perceived by many as a privileged and elitist view of the medium. In addition, significant changes in conceptual and perceptual thinking in the arts, that is, the Bauhaus, put an aesthetic dagger into the once hardy pictorialist heart. At that point in history, the use of platinum and palladium declined but has experienced rejuvenation in recent years through the work of contemporary artists, academic electives in the process, and the booming business of workshops in alternative process disciplines.

**The Process Explained**

In the platinum/palladium process (Pt/Pd), there are three primary and separate solutions.

- **Platinum variation**
  
  Solution 1: Part A: ferric oxalate
  
  Solution 2: Part B: ferric oxalate with potassium chlorate
  
  Solution 3: Part C: potassium chloroplatinite/sodium tetrachloroplatinate (II)

- **Palladium variation (note: a different Part C)**
  
  Solution 1: Part A: ferric oxalate
  
  Solution 2: Part B: ferric oxalate with potassium chlorate
  
  Solution 3: Part C palladium (II) chloride/sodium chloropalladite

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Figure 9–4

Marie Leon, Portrait of Henry and William James, London, c. 1905

(Platinum)

A rare portrait of William and Henry James together, taken in Marie Leon’s Regent Street studio in London in 1905.

(Courtesy of the author)
These solutions are mixed together in a shot glass, in precise droplet based formulas, to form a light-sensitive emulsion (see the drop chart). The droplet mixture is then gently swirled together and deposited in the center of the paper (if you are coating with a hake brush) or along the edge of a Puddle Pusher (if you are glass rod coating). Once the sensitizer is on the paper it is necessary to execute your coating quickly and efficiently. You are working with a very small amount of sensitizer, and it is imperative that you cover your entire printing area with what you have made up in the shot glass. Also, an uneven and sloppy coating will certainly make itself evident in your final print.

Once the paper is coated, it is allowed to sit for a minute and then cool air-dried. The coated paper is then placed in your hinged back contact printer along with your negative and exposed to UV light. Again, a hinged back contact printer is a solid frame with a glass insert and is used to hold a negative in contact with a sensitized paper by means of a split back. This split back is vital to allow you to check on your exposure on one side of the print without losing the negative’s registration to the print sensitized paper.

Figure 9–5
Nancy Marshall, Deer Offering, 1995
To make the negative for this haunting palladium image, Nancy used an 8” × 10” Derdorff camera and a Taylor Hobson variable softness portrait lens. For other work with the Derdorff, Nancy has used a zoneplate pinhole lens.
(Courtesy of the artist)
Once you begin to expose your negative and sensitized paper to UV light, a chemical reaction occurs that converts the ferric salts in the formula to a ferrous state. The image at this point would be visible even if no metal were present in the solution. This image, unlike other iron-based processes, cannot be evaluated easily in a printing-out manner. The ideal state when the print is properly exposed is a “whisper-image” of your intended finished print. This means that the image is simply an undistinguished hint of what you are hoping for following the development stage. If you can see the image clearly prior to development, you have overexposed your paper and it will be necessary to rethink the way that you will develop your print. In most cases this will involve a water or glycerin development rather than a chemical development.

Following the exposure, the exposed paper is developed in one of many developers (in this case ammonium citrate), where it is instantly reduced to a metallic platinum, or palladium, state to the degree that the negative has permitted exposure. At first, the image you will see is iron based but will convert to platinum or palladium metal in the developer. The developed print is then cleared in an acid bath sequence (in this case EDTA) to remove any leftover and unexposed iron ferric salts, leaving a print made entirely of platinum or palladium. The print is then washed for permanence.

The Pt/Pd process has a potentially long tonal range, which many practitioners feel is significantly able to render values well beyond the ability of a traditional silver gelatin paper. It is also able to provide incredible depth and detail in the shadows. These very long tonal ranges, regardless of lengthy exposure times, are partially the result of an odd exposure characteristic called “self masking” that occurs in most POP iron-based processes. Self masking is a term that describes what happens during long exposures when light continues to expose highlights after the shadows have reached a degree of exposure that essentially functions as a filter, slowing down additional exposure in the thinner portions of the negative.

Similar in many respects to the Kallitype, the Pt/Pd process is far more consistent and easier to work with. Platinum/palladium color ranges from cool to warm and is controlled by a number of factors, including developer selection, developer temperature, additions to the sensitizer formulas such as gold chloride, and mixing the two different Part 3 Pt/Pd sensitizers. Palladium is warmer than platinum, but their tonal range is nearly identical. Both “noble” metal variations are as permanent as your attention to good technique, fresh chemicals, and the paper they are printed on.

**Supplies and Materials**

You will need quite a few low-cost items to perform this process.

- The sun (summer is best) or a UV light printer/lightbox for winter in the colder climates and overcast days. The sun is the better option because it is free and many feel it provides a little more contrast in the image.

- Long tonal range negatives with contrast. Generally, if you can make a lovely silver gelatin print from your negative it will be too flat for Pt/Pd. The negative should have a high contrast density range between 1.4 and 2.0 and would be appropriate for a 1 or a 0 grade paper if you were printing it on conventional silver gelatin based papers.

- A hinged contact printing frame to check on exposure (see Appendix E).

- Five clean plastic trays, one of which is used exclusively for the development of the exposed paper. The other trays will be for the three clearing baths and the single washing tray. Personally, I prefer a set of labeled trays that are only used for this process.

- A heavy duty, nontourist variety shot glass for mixing the drop formulas of the sensitizer. By nontourist vari-

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**The Dropper**

There is a common misperception that glass droppers will provide a more consistent drop volume than a plastic dropper. In fact, only the plastic droppers are approved lab ware by the Food and Drug Administration. The reason is that glass droppers are inconsistent as they are “drawn” in their manufacturing. Plastic droppers are molded and therefore maintain a consistent opening at the open-end drop point.
• I mean a *real* shot glass with a heavy, thick base that is made for mixing and drinking rather than one that is used for display on a knick-knack shelf.

• Several clean plastic dropper caps for the little bottles of Parts A, B, and C that you purchase from an alternative chemical supply such as Bostick & Sullivan or Photographer’s Formulary. These can be easily purchased at a pharmacy or a chemical supply house. Be sure that you are using plastic droppers that all are the same type so the drops are the same, that they fit the bottles with the chemicals, and that you have one for each of the solutions you will be using.

• One clean haké brush *without* a metal ferrule. You may also use a glass rod, that is, Puddle Pusher, for a more economical and smoother coating.

• You will need a coating surface that is absolutely clean and dry. It is imperative that your coating area is totally free of contaminants and/or moisture.

• A pencil to mark negative edge area and formula information on your paper.

• A hairdryer, with a cool air setting.

• A supply of distilled water for brush cleaning, mixing dry ferric oxalate A and B chemistry if you don’t purchase it in solution, and for rinsing your plastic droppers.

• You will need a sink with running water and low, non-fluorescent light. Humidity is a plus in the process and necessary when working in the dry air of winter and associated central heating. You can buy a humidifier or run hot water for a bit to add a little humidity to your working space.

• A dual filter respirator is vital if you do not have an adequate ventilation system, when drying your sensitizer with a hairdryer.

It is critical that you purchase fresh platinum or palladium chemicals from a reputable supplier. Freshness is essential for the Part A (ferric oxalate) and Part B (ferric oxalate/potassium chlorate), and, without question, it makes a great deal of sense to purchase your ferric oxalates from a chemical supplier who makes it for a living rather
than making it yourself. Making your own may be romantic but hardly worth the time and effort. In a dry state, and in a tightly covered dark glass bottle, these chemicals will be good for years. In a liquid solution, the ferric oxalate Parts A and B will be past their prime in 6 months at most. The Part C solution, the precious noble metal salts, will last in liquid form for years.

I suggest the purchase of wet pack (premixed) or dry pack (you add the distilled water and wait 24 hours) kits. These packaged kits generally come with the developer (ammonium citrate), a clearing bath (EDTA), and the three solutions in amber bottles. Sometimes they come with droppers, but, again, I suggest purchasing a good set from your local pharmacy. Remember that plastic eyedroppers are preferable to glass because their drop size is more consistent. In most cases you may also order special Pt/Pd printing papers from the same suppliers.

The Negative

A contact negative is essential for printing due to the slow emulsion speed, as in all of the non-silver iron-based processes. Negatives can be made in camera through an internegative process using direct duplicating film or an interpositive to negative multistage duplicating film.

Ideally, the finest quality negatives will be produced in camera but they can also be generated in a film recorder or Photoshop using a desktop printer or a service bureau for output. You may also use a copy machine or you can make up a negative on glass or acetate as in the case of a cliché-verre. It is, however, likely that you have a perfect print on your mind if you have decided to indulge in the platinum/palladium process. Because of this, your negative will probably come directly from a large format or pinhole camera or it will follow the complex route to the perfect digital negative made to your specifications by a service bureau.

Figure 9–7
Suzanne Solis, Susquehanna, Harrisburg, 1998
Suzanne provides a fine example of the beauty that can be created when combining a pinhole negative with the platinum/palladium process.
(Courtesy of the artist)
Negatives for Pt/Pd should be “contrasty.” Again, if you can make a really nice-looking print from your negative on a conventional silver gelatin paper, your print will be flat in Pt/Pd. The negative should show a long linear range of highlight and shadow detail and have an average overall density in the 1.5 to 1.7 range. Please refer to Chapter 2, “The Negative: Traditional and Alternative Options,” for an explanation of what this means. Obviously, a single-step contact negative exposed in a view camera would be ideal, because it would eliminate the possible degradation of the image through a translation sequence. In my workshops, we often use Polaroid Type 55 Positive/Negative sheet film, exposed in 4” × 5” pinhole or conventional camera. This type of film allows for instant inspection of the negative’s qualities and gets each student in the class into the process without delay or lab time.

Figure 9-8
Judy Natal, The Nature of Rage, 1998
This palladium on silk brocade by Judy Natal was generated from a digital negative and is based on her examination of Darwin’s The Expressions of Man and Animals, and the roots of human nature. (Courtesy of the artist)

Figure 9-9
Ernestine Ruben, Nude with Crossed Arms, 1999
Ernestine Ruben made this compelling nude study in platinum on a very fragile handmade paper. (Courtesy of the artist)

Papers and Sizing

The bottom line is: cheap papers will frustrate you. Always purchase the best quality printmaking or watercolor paper. It must be free of impurities and with a surface that is compatible with your intentions. Often, you will find a lovely handmade paper that will simply not hold up under the lengthy wet stages in the process, or that will have components accidentally blended in (metallic bits) that are incompatible with the Pt/Pd process. Be careful not to use a metal utility knife or paper cutter when cutting paper to size because the metal shavings from the cutting process may be on the paper. For this process, it is best to tear the paper using a heavy ruler. This will give you a deckled edge, which, if you object to it, can be trimmed off after the process is completed.
Paper is an individual choice. Personally, I use Arches Platine and have had success with Crane’s Platinoetype but feel the Platine surface is a better support for darker values in my imagery. My friends Craig Stevens and Phoebe McCormick swear by Bienfang 360, and Wendy MacNeil prints on tracing tissue. Others print on Crane’s stationery AS 8111, Parchment Wove, Strathmore’s Artists Drawing, and Fabriano Artisticò. Obviously, the quality and type of paper you select is of great importance and should be decided on with care.

I have found that the majority of papers do not require a sizing step for the platinum/palladium process. You will know that sizing may be necessary when you examine your image and it looks like it is lying slightly below the surface of the paper. Another option is to double coat with heavy pressure using a glass rod coating method when you opt for a paper that is less tight in its surface texture. In the event your heart is set on printing on an esoteric, or difficult, paper, there are sizing formulas in the paper preparation chapter.

The Chemistry

As mentioned, there are three basic ingredients in the platinum/palladium sensitizer. In this chapter we are using an ammonium citrate developer and EDTA for our clearing bath chemistry.

The Sensitizer

Part A: ferric oxalate

Part B: ferric oxalate and potassium chlorate (contrast control)

Part C: potassium chloroplatinite (Pt) or palladium chloride (Pd)

Optional: a few drops of a 1% gold chloride solution

The primary differences in the platinum and palladium chemistry are the price of the noble metal and the color of the finished print—palladium being warmer in tone while the platinum yields a colder black and white image. The combination of the ferric oxalate solutions will be slightly different depending on which Part C (platinum or palladium) you select. The best thing about the prepared kits is that the proportions have been worked out for you and the ferric oxalates are fresh. You can also purchase the optional 1% gold chloride in solution, paper, bottles, and droppers at the same time.

Developer

During exposure, the ferric oxalate is converted to a ferrous oxalate state. In the development stage, which is always an instantaneous and exciting event, the ferrous oxalate functions as a reducer, removing platinum or palladium from the salted sensitizer compound and precipitating those metals into the paper as pure platinum or palladium. This conversion begins in the exposure step but requires the developer to complete the process.

One of the traditional developers for this technique was potassium oxalate, a rather toxic chemical that is not particularly user friendly to work with. Other developer options have included sodium acetate and ammonium citrate. For these notes we are using ammonium citrate (ammonium carbonate neutralized with citric acid), which is a bit more amiable than potassium oxalate. Each of these developers provides a slightly different color to the print, that is, ammonium citrate and sodium acetate yield a cooler print color than potassium oxalate. You may also cool the color of a print by working with a cooler developer. Conversely, warming the developer will warm the print color.

Many Pt/Pd printers will keep the same base developer stock for a very long time and refresh it with new developer when the volume invariably drops due to paper absorption and evaporation. You may wish to remove the sludge that will eventually collect on the bottom of the developer container. If you find it necessary to decant the developer, simply pour it into a new nonmetallic container through a coffee filter sitting in a plastic funnel. Never throw out your developer: it gets better with age. Although this is the conventional wisdom, there is evidence that developers, like everything else, go bad with advanced age. You will know when your developer is not behaving well. Until then, keep recycling, decanting, and adding fresh developer as the volume drops.

Emergency Platinum/Palladium Developer

According to Dick Sullivan, whom I trust on these matters, you can make an emergency developer (in case you spill the whole bottle during a printing session) by going to the supermarket and buying sodium bicarbonate and...
white vinegar. First you mix the sodium bicarbonate (for upset stomachs) with water to make a strong solution. Then begin to add the white vinegar, at a slow pace, until the bubbling in the beaker stops. You will want a completely saturated solution (meaning that the water can no longer dissolve any more of the chemical), so make sure that there is some bicarbonate sludge in the bottom of your mixing container when you are done. After the sludge has been decanted, my best guess is that you will have just made sodium acetate, which will work quite nicely as a platinum/palladium developer.

Two Pt/Pd Developer Formulas

If you do not have prepared developers, try these formulas:

**AMMONIUM CITRATE DEVELOPER**

- 250 g ammonium citrate
- 1 liter distilled water

**POTASSIUM OXALATE DEVELOPER**

- 250 g potassium oxalate
- 1 liter distilled water

The Clearing Baths

The traditional Pt/Pd clearing bath was a dilute solution of hydrochloric acid. A gentler variation was citric acid. We are using EDTA (ethylenediaminetetraacetic acid tetrasodium salt), a preservative often found in commercially processed foods and agricultural use. EDTA is significantly less hazardous than hydrochloric acid, whose fumes will wreak havoc on any person or thing that is around it too long. Hydrochloric acid also makes fibers in the paper brittle. The clearing stage is critical, because it is vital to remove the unconverted ferric salts from the print. The EDTA clearing formula is not compulsively exact and should be set up in three separate and consecutive 5-minute baths.

**Formula for EDTA Clearing Bath**

This is the basic kitchen version.

1 heaping Tbs EDTA  
Water to make 1 quart  
½ tsp sodium sulfite (not mandatory, but it helps)
Emergency Clearing Bath

In an out-of-clearing-bath emergency, you can go to the supermarket and buy 7 Up® soda or Lime Away® tile cleaner (which is used to remove calcium) and see if it works for you.

Another Clearing Option

Another emergency solution would be Kodak Hypo-Clearing Agent. I know of one platinum/palladium printer who clears his prints by giving them a short fresh water rinse and then immersing them in a standard hypo-clearing bath (sodium sulfite/sodium bisulfite and water) for 5 minutes. I suppose this would work well enough but I continue to recommend EDTA as your first option.

The Sensitizer Formula

Again, I recommend that you purchase the premeasured and fresh chemistry kit preparations that are on the market. This would allow you to spend more time making beautiful prints rather than rambling around in your lab area weighing and compulsively mixing chemicals with gloves on your hands and a respirator on your face. However, if that kind of thing makes you happy, here is the traditional formula for platinum and palladium.

<table>
<thead>
<tr>
<th>Part A (Ferric Oxalate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 ml distilled water at 120°F</td>
</tr>
<tr>
<td>16 g ferric oxalate</td>
</tr>
<tr>
<td>1 g oxalic acid (optional)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part B (Ferric Oxalate and Potassium Chlorate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 ml distilled water at 120°F</td>
</tr>
<tr>
<td>16 g ferric oxalate</td>
</tr>
<tr>
<td>0.6 g potassium chlorate (for palladium)*</td>
</tr>
<tr>
<td>1 g oxalic acid (optional)</td>
</tr>
</tbody>
</table>

*Please note that the amount of potassium chlorate changes in the Part B mix depending on whether you are making a platinum or palladium image.
of A and B sensitizer. Platinum images with this formula are cooler, show more contrast, have crisper edge definition, and are richer in tonality. Be careful with lead oxalate if you decide to experiment.

**PLATINUM PART C**

- 50 ml distilled water at 100°F
- 10 g potassium chloroplatinite

If you are making palladium prints, following are two different recipes:

**PALLADIUM PART C - #1**

- 51 ml distilled water at 100°F
- 9 g sodium chloropallidite

**PALLADIUM C - #2**

- 50 ml distilled water at 100°F
- 5 g palladium chloride
- 3.5 g table salt (sodium chloride)

Mix all of the individual solutions, put them in brown bottles with dropper tops, label them with contents and the letters A, B, and C, and let them sit for at least 12 hours.

As for the developer and clearing bath, I recommend buying the prepared ammonium citrate developer and EDTA clearing bath crystals. They are essentially safe, inexpensive, and simple to use. The ammonium citrate can be shipped in a wet state without a problem, but the EDTA should be kept dry until you’re ready to mix it.

Store your mixed chemicals, except for the developer and EDTA, in a dark and cool place to extend their shelf life. Some texts have recommended the refrigerator as a fine place for the storage but I strongly advise against this, especially if there are children in your home. Aside from the obvious lethal danger of an ingestion accident with ferric oxalate, this chemical may also form into insoluble chunks due to the cold environment of the refrigerator. If you are going to refrigerate your chemicals, go buy a small dorm-room-size unit and keep it in your lab.

The emulsion formulas in the following Pt/Pd “drop chart” are dependent on the density and contrast of your negative. This is an important distinction because the majority of published drop charts are formatted to achieve the contrast of the print you desire and hope to finish with. They assume that your negative will always be appropriate for the process, which is seldom the case in a class or workshop environment. It has been my experience, in class and workshop situations, that the reading of the negative is more relevant than wishful thinking about what kind of print you would like. By setting up the drop chart for in-the-hand negative variations I am allowing for...
flexibility in the learning process. I am also assuming that not everyone who wants to print platinum or palladium has the ability to fine tune each of their negatives for the precise and perfect recommended average density. In addition, most people do not have a densitometer sitting around the house.

In the drop chart, notice how the proportion of Part A and Part B change to deal with contrast. Also note the total percentages of A and B to C and how they are constant in all formulas. Be aware that the greater the concentration of Part B (ferric oxalate - potassium chlorate) in your formula the more “grainy” your print will look. It is Part B that will function as a primary control of changes to the contrast in your final print; the more B in the formula, the more contrast in the print.

You may elect to add 1 or 2 drops of a 1% to 5% solution of gold chloride to your formulas. This change will slightly elevate the contrast and will have a slight effect on the color of the final print. As an additional technique, after you really fall in love with this process, you may wish to experiment with sensitizing formulas that incorporate both Pt/Pd salts. This decision will change both the color and the contrast of your image. A good way to begin thinking about this alteration is to learn the Ziatype Process first, where these changes are a normal part of the process.

Drop chart tables have been around for a while. Nearly every text I’ve read uses formulas based on the print desired. I had suspected that the proportional recommendations in the chart published here originated with Paul Anderson, who was the accepted authority on non-silver and special processes in the early part of the century. In fact, the concept goes back to Pizzighelli and Hübl. To my contemporary knowledge, only Nancy Rexroth, in her great pamphlet *The Platinotype 1977*, constructed her chart as the following one does, based on the type of negative that the artist will be working with (see Figure 9-13).

### Preparing the Formula and Coating the Paper

Prepare an area in your lab with subdued light and be sure that it is absolutely clean and dry. Put on your favorite music, get used to the light, and prepare yourself for some moderately compulsive behavior.

Set up a coating board or area, and nearby, have a good quality shot glass (for swirling the drops together) with a short and heavy barrel. The short barrel type shot glass is important so that you don’t leave too much solution behind when you dump it on the paper for coating. Also, you need a pencil for marking the area of the paper that these drops will have
to cover and to write your formula on that same paper. For coating you will need a hake brush *without* a metal ferrule. This brush, once it is used for coating platinum/palladium, should be labeled accordingly and not be employed for any other process. An alternative to the brush, especially if you feel brush impaired, is a glass rod coater, that is, Puddle Pusher. You will also need paper towels, two glasses of distilled water; one for wetting your brush prior to coating and the other for cleaning it afterwards. You may also want a hairdryer set on a cool setting.

Finally, you will need your labeled A, B, and C formulas in their individual brown bottles with droppers and a quality paper to coat on. Under low light, add the drops of Part A to your shot glass. Replace the top before it spills. Then take Part B’s dropper and add the drops from bottle B to the shot glass. This is the part of the formula that will function as your primary contrast control. Replace this top as well. To complete the formula, take Part C’s dropper and add drops from C to the shot glass. Part C is your precious noble metal salt. You will notice that it appears that you do not have enough solution to coat the paper, but with a little practice you will discover that the amount is quite adequate. In the beginning, if you find that this is not the case, simply work with a drop count that is proportionately greater.

Figure 9–14
Dick Sullivan, *Tucumcari, New Mexico, 2000* (Ziatype)
This Ziatype is one of Dick Sullivan’s recent images from a portfolio of Tucumcari, New Mexico. Dick is the creator of the Ziatype, and along with Melody Bostick, is the co-owner of Bostick & Sullivan.
(Courtesy of the artist)
Swirl the solution around in the shot glass and do one of two things. Pour the shot glass solution into the center of the marked-out print area and begin to coat by lightly brushing over the entire area with complete horizontal coverage followed immediately with complete vertical coverage of your negative area. Quickly repeat this sequence until your coating is smooth and free of obvious brush strokes. Do not be concerned if your brush strokes exceed the dimensions of your negative area. Those roughly painted edges are the “signature” look of the hand-coated print. In addition, do not fuss over any hairs from the hake brush that might fall out of your brush during the coating. These hairs can be easily removed during or after the drying stage with a flick of your fingernail. Please refer to the instructions for preventing the hake brush hairs from shedding in Chapter 6, “The Cyanotype Process.” Be sure to be light and delicate with your brushing technique or you may damage the surface fibers of the paper.

Your other coating option is to use a glass rod or Puddle Pusher. Go out and purchase a nice heavy piece of ¼” plate glass that will be larger than your paper. Lay down several sheets of newsprint from a drawing pad on the glass and tape them down to prevent them from moving during the coating procedure. Take your glass rod or Puddle Pusher and pour the contents of your shot glass along the top edge of the area you will be coating. Quickly slide the glass rod lengthwise from side to side in the solution until it is evenly distributed along the Puddle Pusher’s surface edge. Slightly raise the rod and place it along the back edge of the solution. Then drag or push the solution, with pressure, across the paper. Repeat this single stroke in the opposite direction if there is an obvious abundance of solution left after the first pass. This is the best way to avoid roughing up and disturbing the smoothness of your paper. Unfortunately, you don’t get to have the romantic brush strokes.

Finally, let the solution sit quietly in the paper for 2 to 5 minutes in very subdued light. After this waiting period, while you are cleaning your brush and the shot glass, take your hairdryer, put it on a cool setting, and gently blow-dry the back of your paper. If you are blow-drying in a space without excellent ventilation, wearing a dust mask is a sane idea due to the ferric oxalate in the formula that will become airborne during the blow-drying.

**Exposure**

When your paper is dry, take your negative and place it on the dry sensitized paper so that the final print will be “right-reading.” Put the negative and the coated paper into a hinged back contact printing frame so that you can monitor the exposure and get ready to go sit in the sun or, less romantically, to put the negative and paper into a UV exposure unit. If you are using a UV printer, do not look at the light source during the exposure (it is like a tanning booth) and turn the unit off before checking on the exposure. Printing times will be dependent on the negative’s contrast, density, and the formula you made. A higher contrast emulsion may require as much as a 50% increase in exposure. Try to control your contrast via formula rather than exposure time.

**Best Advice**

Expose your paper until you see a “whisper” of detail in the print. This process does not have the same personality in its printing-out stage as do many other iron-based processes. This is why keeping track of your progress with notations on the paper is so important. I advise my students to write all pertinent information on the bottom front of their prints so that evaluations, in a lab or critique, are easily made. These notations are written in the following order: Part A, Part B, Part C, any additional drops such as gold, time of day, month of the year, and weather conditions. It should look something like this:

7-4-12  2/1% gold  1:30pm  July sun  85˚F humid

This information tells me by looking at the formula that the negative was an average one for the process. I also know that 2 drops of a 1% gold chloride solution have been added. I know that the exposure took place in July, in sunlight, and that the weather was hot and humid—a perfect Ziatype printing day if your Pt/Pd session is not going well.
De veloping the Platinum/Palladium Image

After the UV exposure, take your closed contact frame into the lab. Have a very clean and very dry tray waiting for you that is used only for development of platinum and palladium prints. I want to emphasize the importance of an exclusive tray for development, because chemicals from other photographic procedures may be present no matter how well you wash your trays, especially in a communal lab.

Take the exposed paper from the contact frame, place it face up in the bottom of the dry tray, and notice the very pale yellow whisper of the image. If you can see the image clearly, and if it is fully defined and dark, then you may want to forget about the ammonium citrate development and begin to think about using distilled water as a developer instead. If your predeveloped image looks correct, immediately, with complete coverage, pour the ammonium citrate developer on the surface of the print. Any hesitation in this step may result in uneven development that will show itself as a distinct flaw in the image. You may also have uneven development if you stop to admire the image before the paper is completely covered with the developer. Development is nearly instantaneous. You may leave the paper in the developer for up to 2 minutes if you want, but it really isn’t necessary. Examine the print and you will notice that your highlights are yellow. This indicates that it is time to go on to the next step: the prewash and clearing bath.

Prewashing and Clearing

I like to put the developed paper into a bath of fresh water for a minute before going into the clearing bath sequence. This provides me with an opportunity to evaluate whether I want to bother going through the 15 minutes of clearing bath stages. It also gives me an idea of what I will change with a subsequent formula that I’ll be making while my print clears. Also, the water bath gets some of the developer and residual ferrous salts out of my print and keeps my clearing baths fresher.
Preparing Three Trays with the EDTA Clearing Bath

The casual clearing bath mix is 1 heaping tablespoon to about 1 quart of water; you may add the $\frac{1}{2}$ tsp of sodium sulfite if you like but this is an addition that I rarely think about. I provide this formula in nonmetric measure because most of my students forget about the gram scale at this point in the procedure and just guess at the amounts. Fortunately, the EDTA clearing bath formula is very flexible and anything close to this mixing suggestion will be satisfactory. EDTA comes in a few different forms, and the best way to obtain it is to go to a source that sells it specifically for platinum/palladium clearing purposes.

Place the print into clearing bath #1 and periodically rock it gently for 5 minutes. During this first bath clearing time, pour your developer back into its bottle (never throw your developer away!). Also, because you have the time, wash and thoroughly dry your development tray so that it is ready for the next print or person who uses it. After 5 minutes, place the print in clearing bath #2 for another 5 minutes. You should clearly begin to see the highlight and shadow definition at this stage, and the yellow tint in the highlights should be nearly gone. After another 5 minutes, place the print in the final clearing bath #3 for an additional 5 minutes. After every 6 to 8 prints, make a new #1, place it in the #3 position, and move #2 to position #1 and #3 to position #2. Rotate the trays in this manner through the duration of your lab time.

If you find that you are still having problems with yellowing in your highlights following the third EDTA bath, you might want to try this recommendation. Make up a tray with a 4% solution of sodium sulfite (4 g to 100 ml of water) and set it in your sink. Following the third EDTA bath, rinse your print for 2 minutes in water and then put it in the sodium sulfite solution for 5 minutes. Then follow the final wash instructions.

Finally, wash the print for 20 to 30 minutes and hang it on a line to dry. As with any non-silver, or alternative process, screen drying is just asking for trouble because other people in the lab may not have your same cleanli-
ness and washing concerns. If you intend to make another print from the same negative it would be a good idea to force dry the first one so that you can adequately evaluate what you did. Dry down on Pt/Pd is significant (15% to 20%), and trying to evaluate the formula you used, without this step, will be difficult without experience.

**Some Points to Consider:**

**Trouble-shooting**

- It’s a good idea to print coated paper very soon after it is dry. The hydroscopic nature of paper means that it will collect moisture from the air, and this may result in foggy tonal values in your print. A little humidity is fine, so don’t get too compulsive about it. Cold and dry weather will often have a less-than-pleasing effect on your printing. In the winter, humidify your working space to about 55% to 60% humidity. Light Impressions sells an inexpensive hydrometer to measure the humidity level in your workspace (see Appendix E). In addition, if your image looks great in the developer but looks weak following the washing and clearing baths, there may have been too much humidity in the lab, which caused a drying time that was too slow. Try to coat and dry within a 10 minute time period—including the 2 minutes you let your print meditate after the coating step.

- Longer printing times, out of direct sunlight, will increase contrast. One of the best demonstrations I ever gave was in a dense fog at the Maine Photographic Workshops, where I teach this material each summer, that lasted nearly a half-hour.

- Cold developer is appropriate whenever you have over-exposed your print. Cold developer will give more contrast to your image than a warm developer as well as a cooler tonality. Warm developer is appropriate whenever you have underexposed your image. It was not unusual, according to Pizzighelli and Hübl, to place an underexposed print into boiling developer to make up for an inadequate exposure time. A warm developer will give a slightly warmer image. A warm developer may also help with any staining problems you may be having; somewhere around 100°F will work well.

- If you radically overexpose your print, you may develop it in distilled water. You may also eventually add a little of your developer to this water to see if it changes anything or to “punch” it up at the end. There is a technique, covered in several texts on this subject, concerning localized brush development with glycerin. If you’re interested in glycerin development, some of the historical texts describe it, and there is also a good description of the technique in Nancy Rexroth’s *The Platinotype, 1977.*

- Never allow your coated paper to experience a lot of fluorescent light because this type of light does emit a degree of UV light and may contribute to fogging.

- If your print appears fogged, it may have been dried at too hot a temperature. Allow the paper to sit for a few minutes after you coat it, and then when it’s time to finish the drying stage, be sure that the hairdryer is set on a cool setting and to dry from the back of the print first.

- Never throw your developer away. You can filter it with a coffee filter when it gets too “sludgy,” and you can add fresh developer to it anytime to keep the container full and prevent evaporation.

- Never expose your sensitizer solutions to any metal utensils. Use a hake brush or glass Puddle Pusher for coating. Tear your paper to size with a plastic ruler rather than a knife or paper cutter. Use plastic trays and store your chemicals in glass bottles. Designate one brush for this process alone and label it. Also, designate and label one tray for Pt/Pd development and try not to use it for another purpose.

- You do not have to be married to the formulas: alter them to suit your needs but keep the proportions of A and B to C the same no matter how much sensitizer you’re mixing up. Keep meticulous notes; it will save you time and money.

- If you have foggy or muddy highlights in the print, these might be some of the reasons: the paper was fogged by strong light before exposure; the ferric oxalate went bad (buy kits and use them within 6 months); your negative was too thin and your exposure was too long for it; the formula you selected was an incorrect analysis of what your negative required; there was mois-
ture in the paper; your hairdryer setting was too hot; cold and dry weather dominated your lab space—or, bad karma.

If your image is too weak and thin it might be because: the paper was too damp when you made your exposure; your chemicals were not fresh; you made an incorrect evaluation in your Part B concentration; you used an exposure time that was too short; you used a negative that was either too flat or too dense—or, bad karma.

If you have black spots, streaks, and blemishes, some of the causes may be: that there were fingerprints on the paper, before and after coating, or that your print experienced metal contamination from a metal ferrule on the brush, mat knife, or paper cutter; moisture or chemicals may have contaminated your working area; your developing tray was not completely washed or dry; you may have used contaminated brushes; there may have been impurities in Part C of your formula; you may have been working next to others who think extravagant gesture is a standard requisite for brush coating; your developer technique was too slow or hesitant—or, bad karma.

If you have a yellow-stained print it is the result of an active pH flux due to the formation of an iron complex. The stains might be there because: you forgot the clearing bath; your clearing bath may be exhausted; your developer has become too alkaline; small amounts of citric acid can slightly adjust the developer back to an acidic state or remix it and start over; your times in the clearing bath were too short; you didn’t take my rec-

Figure 9–17
Katie Miller, *Spiritual Waters #3, 1999*
Katie Miller, a former workshop student of mine, made this platinum/palladium print from a greatly enlarged digital negative following the recommendations in Dan Burkholder’s book, *Making Digital Negatives for Contact Printing.* (Courtesy of the artist)
ommendation of revolving your clearing bath trays and adding a new bath every 6 to 8 prints; your EDTA-to-water concentration is way off. Karma has very little to do with a yellow stain.

There are exceptions and explanations to most every problem one might encounter with the platinum/palladium process, but sometimes, even the best Pt/Pd printers have bad days and can’t explain them. Sometimes you just have bad karma—so relax and try the print again.

Cyanoype, Gum, and Van Dyke with Pt/Pd

Some days, everything seems off, and on these special occasions you might want to take your less-than-successful prints and experiment with them after they are washed and dried. Try other alternative processes in combination with the platinum/palladium; most can be applied on top of a Pt/Pd print, and it was quite common, throughout its popular history, to apply a light gum bichromate print.

Figure 9–18
Edward Steichen, The Little Round Mirror, 1902
(Platinum and gum)
Edward Steichen had one of the most outstanding careers in the history of photography and made his first photograph in 1879 at the age of 17. A member of the Linked Ring and one of the founders of the Photo-Secession in 1902, Steichen went on to become Director of Photography at the Museum of Modern Art and curated the landmark exhibition, The Family of Man. This image is a platinum and gum bichromate print. (Courtesy of the Royal Photographic Society)
on top of a palladium print for additional coloration. The application of a second process, such as gum or cyanotype, will often intensify the shadow details and impart greater depth to the image. In the last year or two I have made a habit of applying short, dark pigment gum exposures to any print that seems weak to me and have actually salvaged quite a few that I would have normally trashed before the clearing baths. This particular technique, by the way, was a favorite of both Edward Steichen and Alfred Steiglitz.

Cyanotype is often effective in adding density to weak shadow details. Make up a standard A and B cyanotype formula, dilute it, and coat your dry and flattened Pt/Pd print. Briefly expose your negative, in registration, and follow the traditional cyanotype process steps. I recommend a specific dilution, but your negative, print, and intentions are necessary for that.

I began experimenting with the Van Dyke/Palladium process around 1990 after making an aesthetically impaired Van Dyke. Though it still provides surprises from time to time, like any experience with a second process in combination with Pt/Pd, it is a technique that can produce absolutely beautiful tonalities and color variations. The primary elements to look for in a successful print are deep and warm shadow details and luminous highlights that, when done perfectly, seem to glow from the inside of the paper. You may also want to consider going in the other direction by overprinting the Van Dyke on top of a platinum/palladium print. This process seems to work best with Van Dyke images that exhibit shadows that are blocked up and highlights that are a bit stark or too dense in the negative to bring out easily in a Van Dyke. Overprinting in palladium will often solve some of these problems, which will open up the shadows and give life to the highlights. You have a better chance at success when Parts B and C of the Pt/Pd formula make up the primary drop load.

Prepare your paper for a multiple printing stages by pre-soaking it in hot water for 10 to 15 minutes and then hanging it on a line to dry. Paper shrinking, or sizing, is optional, but in most cases it is a good idea if the registration of the negative through all stages of the printmaking is important to you. The registration technique is discussed in Chapter 13, “The Gum Bichromate Process.”

Coat the palladium on top of the Van Dyke, and don’t be surprised to see the image bleach to yellow and fade. I realize that there may be a question here—why do this if the Van Dyke is going to basically disappear? I’m not exactly sure except that the resulting prints are quite a bit different from either technique by itself. Then expose the recoated paper to UV light and process the palladium image normally, paying close attention to the recommended EDTA clearing bath times. After the clearing, wash your print in cool running water for 30 to 40 minutes and hang it up to dry. In most cases, if the print looked great when it was wet, then it will likely dry down too flat. Print for an image that is a little weak-looking in the wash and you should end up happy in the end. One last thing, I have found that a finger-rubbed application of Dorland’s Art Wax to these prints, after they have dried, will often enrich the blacks and soften too hot highlights.
Figure 9–19
Christopher James, 
Vatican Bride, 
Rome, 1987

Vatican Bride is a plastic camera generated image. The negative was translated, via direct duplication film (SO-132) and printed in platinum.
(Courtesy of the author)