APPENDIX III

Cochineal Recipes

RECIPES FOR DYEING WITH COCHINEAL

During the course of my research I have come across many recipes for dyeing with cochineal. I have included examples of these recipes here. I have also included references from the bibliography which contain information on how to dye with cochineal.

The recipes given do not represent all the recipes found in the books listed in the bibliography. In time the recipes, with very little variations, begin to repeat themselves. Liles states that, "cochineal is polychromic, producing many colors and shades that vary with the different mordants, mordant combinations, and the pH of the dyebath" (Liles 1990, p. 28). Color results also depend upon the type of fiber that is being dyed. Cochineal is an animal substance and works best on animal fiber. Cotton, which is a plant fiber, must be chemically prepared before it is receptive to the cochineal dye. My purpose in giving these recipes is to acquaint the reader with the multitude of colors derived from the addition of mordants to cochineal.

The oldest recipe for dyeing with cochineal is the Pre-Columbian Zapotec Cochineal Dyeing Procedure; it has been listed first. While it was found to be in use today in Oaxaca, it may be assumed the this recipe was used in Pre-Columbian times.

Pre-Columbian Zapotec Cochineal Dyeing Procedure

Gather leaves from the tejute, or hoja lisa (Miconia argentea) tree in the Pacific lowlands in the Isthmus of Tehuantepec (historic route).
Grind 1/2 lb cochineal into a powder with a metate and grinding stone (today most cochineal used is not locally grown but purchased from Peru and Tehuantepec, Mexico).
About 2 lbs. of wool are soaked in a tub of clear water
When the dye bath starts to steam, add three to four handfuls of dried crumbled tejute leaves (possibly contained oxalic acid as do other trees from family Melastomataceae) (oxalic acid is a color intensifier and mordant).

Add juice from eighty fresh limes (citric acid used only after Spanish arrived and brought citrus fruit trees, knowledge of ancient acidifier not documented and lost).
1/2 lb of cochineal
2 lbs of water soaked wool
Simmer for one to one and one-half hours
When dyeing complete, remove the wool and hang in a tree to dry
Dyed wool is then taken to a flowing stream for washing
Rehang in tree for final drying.
(Ross 1986, p. 66, 72, 73)

Indian Crafts of Guatemala and El Salvador

Cochineal is used for dyeing wool red. It is mordanted with a solution made of limes. Thirty limes must be boiled to produce the mordant for one pound of wool. A very brilliant red is made by the addition of a plant called by the Indians chinchinegrito or cinconegrito (Lantana camara L.). Other shades of red are obtained from the various species of the palo de Brasil or campeche tree.

(recipe taken from Indian Crafts of Guatemala and El Salvado, by Lilly de Johgh Osborne 1965)

Recipes From The Textile Arts

Certain qualifications apply to the use of natural dyes with fabrics. Many fabrics dye best in a slightly sour bath, especially wool, silk dyes best in soapy water and cotton in an alkali medium. A sour bath can be obtained by adding a little vinegar, an alkaline bath by adding lime. Pre-historic man obtained lime for mordanting from wood ashes, such as the ash from green juniper needles.

Dyeing cotton red with cochineal. For 1 pound of cotton use 150 grams of sumac, 100 grams alum, and 20 grams cochineal, using sufficient water to cover the garment. Soak the cloth 1 day in the sumac, soak and stir 2 to 3 hours in a hot alum solution, then boil slowly in the cochineal solution for about an hour.

Dyeing wool red with cochineal. For 1 pound of wool use 1 ounce stannous chloride, 1/2 ounce cream of tartar, and 40 grams (about 2/3 ounce) cochineal, with enough water to cover the garment. Mordant the wool for 1 hour in the stannous chloride and cream of tartar and rinse thoroughly; boil the fabric in the dye bath for 1 hour. In both cases put the wool into the solutions when the water is warm; gradually raise the temperature to boiling and keep at a slow boil or just below boiling. Stir occasionally. Remove and rinse in warm water. Always handle wool gently.

(recipes taken from The Textile Arts by Verla Birrell 1959)

Recipes from Ancient Dyes for Modern Weavers

Method for the dyebath. To prepare dyebath tie 1/4 ounce cochineal powder in a cheesecloth bag and put it in 1 quart of water to soak for 3 or 4 hours, or overnight if that is more convenient. After soaking, bring the cochineal bath to the boiling point and boil it vigorously for 15 minutes. Remove the bath from the heat and take out the cheesecloth bag with cochineal. Add enough water to make 1 quart of dyebath.
* For each ounce of yarn to be dyed according to any of the following recipes, 1 quart of dyebath must be prepared.

Cochineal with alum (crimson). Place the 2 wet skeins of alum-mordanted yarn (i/2 ounce each) in 1 quart of dyebath. Simmer gently for 1 hour, and then allow the skeins to cool in the dyebath. After cooling, remove the skeins and rinse. The yarn will be a crimson red.

Cochineal with tin and cream of tartar (scarlet). Place 2 wet skeins of unmordanted yarn in 1 quart of dyebath and simmer gently for 45 minutes. Remove the skeins and set them aside. Dissolve 1/16 teaspoon cream of tartar in 1/4 cup water and add it to the dyebath, stirring to distribute it evenly. Replace the skeins in the bath and simmer an additional 30 minutes. Allow the skeins to cool in the dyebath and then rinse, first in soapy water and then in clear water.

Cochineal with Chrome plus Vinegar (reddish purple). Mordant 2 skeins of wool with a chrome-mordant. Add 2 teaspoons white vinegar to 1 quart of dyebath. Place 2 wet skeins of chrome-mordanted yarn in the cochineal-vinegar dyebath and simmer gently for 1 hour. Allow the skeins to cool in the dyebath and then rinse thoroughly.

Cochineal with Vinegar (light purple). Place 2 wet skeins (1/2 ounce each) of unmordanted yarn in 1 quart of dyebath and simmer gently for 1 hour.
Allow the skeins to cool in the dyebath and then rinse thoroughly.
* All of the dyebaths used above still have dyeing potential. They may be used to dye new skeins of yarn in less intense variations of the colors first produced.
*Another interesting way to use them is to add other mordants, such as 1/16 teaspoon iron or 1/4 teaspoon copper sulfate, to make gray or gray-purple. *If 1/16 teaspoon oxalic acid is added to the cochineal bath without the vinegar, it will serve to renew the bath and produce redder colors.
*A mordant acts on the molecules of the fibers, breaking existing chemical links and forming new ones. The new molecules are capable of taking the dye into the fiber. The word mordant comes from the Latin word mordere, which means "to bite".

(Recipes and instructions taken from Ancient Dyes for Modern Weavers by Palmy Weigle 1974)

Recipes from Nature's Colors: Dyes from Plants

Use scoured, presoaked, alum-mordanted,wool or silk; or cotton mordanted first in tannin and then with alum (8 ounces), add 2 and 1/2 ounces cochineal to 3 gallons distilled water or enough to cover textile in a non reacting dye pot Add cochineal and a little water in the dye pot, boil for a few minutes, add 3 gallons of water and the textile to the dye pot, boil for 30 minutes, cool and rinse, dry in shade
* For silk use 3 ounces of cochineal and heat bath gradually to 212 degrees (100 degrees C) for 30 minutes
* A pinch of tin crystals and cream of tartar added toward the end of dye period will yield a scarlet (Remove textile from bath briefly while these ingredients are being added).
*Good results can be obtained by experimenting with various mordants.

(Recipes and instructions taken from Nature's Colors: Dyes from Plants by Ida Grae 1974)

Cochineal - Scarlet on Silk
Soak overnight in 2 to 4 quarts of water 2 oz well ground cochineal, then heat to near boiling the next day for 30 minutes. Prepare dyebath by adding 4 to 6 quarts of room-temperature water to a nonreactive vessel. Dissolve 1 ounce (30 grams or 10 level

teaspoons of cream of tartar in the dyebath. Add 13 grams (2-1/2 level teaspoons of tin (stannous chloride). Stir until dissolved. Add the cochineal to the dyebath. Add the scoured, well wetted-out silk. Work for a few minutes, then heat the dyebath up slowly to 160 degrees to 180 degrees F. Maintain this temperature for one hour. Remove the silk, squeeze excess dye, wash, rinse, and dry.

Cochineal - Scarlet on Wool

*Also called "fire scarlet," "Dutch scarlet," and "gobelin scarlet," - requires little cochineal. Scour the wool well, rinse, and leave damp. Heat 5 gallons of deionized or soft water to about 180 degrees F in stainless steel, nonreactive, or block tin vessel. Add 1 ounce of cream of tartar and stir until dissolved. Grind 1/3 to 1/2 ounce of cochineal. Add cochineal to hot dyebath and stir well.

*Small amounts of yellow dye such as 2 grams of black oak bark, or 3 grams of fustic, or 3 grams of turmeric could be added, preferably near the end of second dyeing.

Simmer for 20 minutes, add 1 ounce of scarlet spirits (Napier, no. 29).

Add wet yarn or piece goods. Move material frequently. Simmer for 1 and 1/2 hours. Remove dyed material, drain, cool and air for 15 minutes. Rinse in cold water. Material should be an orange scarlet. Empty dye bath and add 5 gallons of water. Bring water to 180 degrees F. Add 1/3 to 1/2 ounce cochineal and 1 ounce scarlet spirits. Stir well. Reenter the material/wool and simmer for 1 and 1/2 hours. Remove cool, rinse and dry.

*If cochineal is good only 2/3 ounce per pound is required.

*If cochineal has become damp in storage, a rich scarlet may not be obtained, only purples.

*Too much scarlet spirits may turn the dye bath too orange.

*If you do not have scarlet spirits, use 3/8 to 1/2 ounce stannous chloride. One half added to water for first dyebath and 1/2 for second dyebath.

If dyebath is too flame orange, add a little alum (already dissolved in hot water) near the end of the second dyebath. Or you could also use 1 to 3 teaspoons of washing soda in 10 gallons of hot water. Work the material in this solution for a few minutes to 1 hour and then rinse very thoroughly.

*Cochineal was seldom used on cotton. The recipe below is the result of the authors experimentation.

Scour cotton well, rinse, and leave material damp. Mordant the cotton with tannin, 1 ounce in 4 to 6 gallons of hot water for 6 to 12 hours (could be left overnight). Remove, squeeze, and mordant with a basic alum for at least 12 hours. Remove, squeeze, and dry. Mordant with copper sulfate at the rate of 1/2 to 3/4 ounce. Add the copper sulfate to 4 to 6

gallons of hot water in nonreactive vessel. Add the cotton and heat the bath to 170 degrees to 190 degrees F. Mordant at this temperature for one hour. Remove and dry or immerse directly in the cochineal dyebath prepared from 2 to 4 ounces of cochineal. Work the material at room temperature, then heat the dyebath to 170 degrees. Dye at this temperature for about one hour. Remove, squeeze, rinse or wash, and dry.

*Omission of the copper will produce a more crimson and less violet color.

*This recipe may be used as an overdye with indigo.

*Many other recipes for dyeing with cochineal may be found in The Art and Craft of Natural Dyeing.

(Recipes taken from The Art and Craft of Natural Dyeing: Traditional Recipes for Modern Use, by J. N. Liles 1990)

Recipes from A Handbook of Dyes from Natural Material

Cochineal Handpicked in Arizona

*Cochineal Dactylopius sp is found wild in Arizona and other parts of North America. The species Dactylopius coccus is the commercial domesticated species usually used by dyers. Both produce the same dye.

*One ounce of cochineal will easily dye 1 pound of wool.

Simmer cochineal and mordant in water until all color has leached out of the bugs; this may take 30-60 minutes. Strain and add yarn.

Pour dyebath and yarn into a glass container and place in the sun until you like the color of the yarn. Remove yarn and rinse. A strong purplish pink color is achieved with 4 tablespoons of alum mordant per pound of wool.

A moderate purplish pink color is achieved with 1-2 teaspoons of tin mordant per pound of wool.

Recipes from Mexico

* For dyeing with cochineal use vinegar and ammonia to effect the final color outcome on wool.

*Using a vinegar post bath, and an alum, cream of tartar pre-mordant bath, cochineal dyed wool turns a bright red.

Pre mordant wool with 5 and 1/3 tablespoons of alum and 2 and 2/3 tablespoons of cream of tartar in 4 gallons of water per pound of wool. Simmer 1 hour; cool yarn overnight in bath, remove and rinse. Add cochineal to 4 gallons of water and heat to extract the color.

Cool water with cochineal and add pre-mordanted wool to cool bath; leave for 24 hours. Place wool in a vinegar bath until color shifts (add enough vinegar to water bath to shift the color). Remove and rinse.

* Without mordant cochineal dyed wool turns a dark red when allowed to sit in a dyebath 24 hours.

* With an alum and cream of tartar pre-mordant bath and an ammonia post-bath, cochineal dyed wool turns a strong purplish red. Pre mordant wool with 5 and 1/3 tablespoons of alum and 2 and 2/3 tablespoons of cream of tartar in 4 gallons of water per pound of wool. Simmer 1 hour; cool yarn overnight in bath, remove and rinse. Add cochineal to 4 gallons of water and heat to extract the color. Let bath cool and add pre-mordanted wool to cool bath. Let stand in cool bath for 24 hours. Place wool lin ammonia bath (freely add enough ammonia to a water bath to shift the color of the dyed wool) until color shifts to a strong purplish red. Remove and rinse.

Recipe for Dyeing Silk with Cochineal

* A wide range of colors are achieved using varied mordants, acids, soap and the ratio of cochineal to silk.

* Acid added to dye baths tends to orange the dye while soap rinses tend to blue the colors. The mordants given are alum, cream of tartar, chrome , iron, and tin.

*Silk is dyed a pure crimson red color using 8 ounces of cochineal (Dactylopius coccus) with a tin pre-mordant bath and a chrome afterbath.

*Silk is dyed as a rose color using 4 ounces of cochineal with a tin pre-mordant bath and a chrome afterbath.

*Silk is dyed a coppery plum color using 3 ounces of cochineal with a tin pre-mordanting

(Recipes and instructions taken from A Handbook of Dyes From Natural Materials by Anne Bliss 1981)

DYE WASTE DISPOSAL

It is vitally important that the natural dyestuffs using heavy metal mordants (chrome, copper, iron) be properly disposed of. Waste with these heavy metals must not be put through septic systems or thrown out on the ground. Heavy metals contaminate. Any plumbing which copes with modern industrial dye wastes must not be used for disposal of heavy metal mordants, phinting pastes, or photographic chemicals. You must keep these wastes entirely separate.

(1) All baths must be settled.

(2) An evaporating pit (sealed concrete base and sides with mesh cover) is the best receptable.

(3) The final sludge must be disposed of in the most appropriate manner. As of 1987, no one could tell the auther what was the best manner. Check CSIRO on this. If you have any other solvents, brighteners, etc., check these separately with CSIRO (Dudley 1987, p. 9).

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