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DATA SHEET

Twenty Ancient Dyestuffs

Nicholas Von Robison

1) Madder (*Rubia tinctorum*) is one of the most ancient dyes, and its color fastness ranks among the best. It is such an excellent source of red that its name (rubia) means red in several languages. In Holland, during the fifteenth, sixteenth, and seventeenth centuries, it was the principal source of wealth. By 1792, encouraged by Charlemagne, France was the top grower. We are told that the French Revolution ruined the farmers; they were later revived by a decree of Louis Phillippe which made red caps and trousers mandatory for his army. Likewise in England, imported madder was also used for their army uniforms (redcoats). Before the "Madder Disaster", England's total imports came to one million pounds sterling. When Alizaron, or synthetic madder was synthesized in 1869, a world madder production of 70,000 tons yearly declined to nothing. Historians speak of untilled and abandoned madder fields and of thousands of starving farmers.* *Madder today can sometimes be hard to find or sometimes sweet woodruff, one of the madder family that produces a less potent red dye, will be substituted. In preparing the dye from roots, be sure not to use too much heat or boil it too long as the color may shift to a muddy brown.

2) Hemlock (*Tsuga canadensis*), also called Eastern hemlock or sometimes Spruce pine, is an important tannin dye. The bark, either fresh or dried, produces a wide range of colors from rose to slate gray. The nice thing about this plant is that hemlock grows over a wide area of the North Americas so it is easily procured with very little expense. I get mine from a landscape gardener who always saves me a bag of trimmings from one of his pruning jobs. A sharp knife will easily strip away the dark outer bark to reveal the red-purple streaks inside. Slightly fugitive, as regards colorfastness.

3) Cochineal is a red dye made from an insect (*Dactylopius cossus*) that is cultivated on opuntia cacti in Mexico, Central America, and the Canary Islands. The Aztecs used this dye long before the Spanish invasions in the sixteenth century, and the Spaniards brought the dye to Europe where it replaced kermes, the red dye obtained from the oak tree shield louse. Cochineal proved to be a superior dye to kermes and a more profitable one because it could be grown year round in warm climates. The life cycle of the insect is three months and in a good year three harvests may be obtained at the rate of about 200 pounds per acre. One pound of dye powder contains 70,000 bugs. You can obtain the dried insects and powder them yourselves and this is more desirable than buying the dye powder as you know exactly what you are getting. Silver cochineal (produced from the impregnated females before they lay their eggs) is far superior to the dark (produced from the females after the eggs are laid) as the silver crop gives a better color which is very fast to fading.

4) Sandalwood (*Ptercocarpus santalinus*), also called sanders wood, is a tropical tree native to India, Ceylon, and the tropical areas of Asia. It produces some striking reds that are unobtainable with other dyes. Because it is an extremely hard wood and is reluctant to give up its color without a lot of soaking and heating, it is not used as much as it should be, except in extract form (see heading 20 for an explanation of dye extracts).

5) Brazilwood is obtained from redwood trees known botanically as *Caesalpina echinata*. The name comes from the Arabic word braza, meaning bright red. About 1500 A.D., traders who first landed on the northern part of

* See *The Cultivation of Madder*, G. Schaefer, in Ciba Review, No. 39, May 1941, pp. 1398-1406.

the South American continent found great forests of redwood trees and gave the name "Terra de Brazil" to the area. Dyers of old used brazilwood as an additive to heighten the color of madder, or as a cheaper substitute for cochineal. The dyestuff is found in the heartwood of medium-size trees. This will be brownish red and it yields its best color if it is chipped into small pieces and allowed to soak a week before using. Will fade somewhat but less so when mordants are used.

6) The alkanet plant (*Alkanna tinctoria* or *Anchussa tinctoria*) has been used since antiquity for its unique red. Pliny mentions it being used to dye wool, Indians painted their bodies with it, and in the Middle ages it was used to make "red butter" - the cure for such ailments as a bad fall. In *A Cabinetmakers Drawing Book*, Thomas Sheraton noted that when he was French polishing mahogany he put a few of the roots into the polishing rag to enhance the redness of the wood. The roots of these perennial plants should be chopped into pieces before using and then soaked. Acids such as vinegar or oxalic acid will help provide a brighter red while alkalies will shift the color to blue. Will not fade very much.

7) Logwood (*Haematoxylon campechianum*) is a small, many-trucked redwood tree that was named by the Spaniards who discovered it on the shores of the Bay of Campeche in Mexico. Logwood was introduced to Europe in the sixteenth century and was especially prized because it could produce a good black with an iron mordant. In colonial America it was one of the six principal imported dye materials because it produced a number of colors and was inexpensive (6¢ a pound in the 1830s). The dye is found in the heartwood of the tree and its manner of preparation similar to Sandalwood and Brazilwood. Fading is minimal.

8) The Indigo plant is a member of the legume family and its name in Latin, *indicum*, means "from India". There are several varieties of the indigo plant, the one most often used in antiquity being *Indigo tinctoria*, but *Indigo suffruticosa* is what you will probably find today because it grows in the southeastern U.S. The dye potential is contained in the leaves of the plant but it takes a complex process of fermenting and oxidizing before it becomes soluble in water so it is almost always found in powder form. Be sure you get the natural indigo and not the synthetic.

9) The dye known as Fustic actually comes from two plants. "Young" fustic comes from the branches of the smoke tree (*Rhus cotinus*). It is not readily available today but "old" fustic is, the dye from a tree of the Mulberry family (*Chlorophora tinctoria*). The dye comes from the inner part of the tree and is bought in slivers or as an extract. If you do obtain the wood it is best to shave it into slivers and soak for at least 24 hours before using. Boiling will bring out the color better after this soaking but if it is boiled for too long the color will be dulled. Colors range from bright yellow to golden or greenish yellow and it is only slightly fugitive.

10) Saffron (*Crocus sativus*) should not be confused with the spring blooming Crocus sold in nurseries. The dye comes from the dried orange stigma of the flowers and is used as a medicinal and cooking herb as well as a dye. In ancient Greece it was considered a dye for royalty, the Romans used saffron water as a fragrance for their theaters, and in the Middle ages saffron was a much sought after dye material in the trade centers of northern Italy and Switzerland. Dye merchants still carry this but it can be found a lot cheaper in many neighborhood Spanish groceries. Good yellows from this with very little fading some say, while others say that it fades a bit. I have a test piece of saffron dyed holly that hasn't shown any discernible fading in 5 years, but I won't say what it will do in the next 5, so take your own chances.

11) Tumeric (*Curcuma longa*), a perennial herb native to India and China is sometimes called the Indian saffron plant. It is decidedly fugitive and will fade drastically in direct sunlight so it is best to use it only as an overdye with such things as fustic and weld (deepens their colors), or with aniline yellow. The tubers can be obtained from dye houses or tumeric powder (curcumin) can be found in the spice section of any supermarket.

12) The dye made from the barberry bush (*Berberis Vulgaris*), a familiar landscape shrub throughout the U.S., produces a strong yellow that is only slightly fugitive. It is rich in natural mordants and helps to heighten both the life and intensity of a color. Both the green leaved and red leaved varieties may be used with success. The dye is in the inner wood of the stems or the vivid yellow roots.

13) Weld (*Reseda luteola*), also called dyers weed, is considered to be the oldest yellow dyestuff known to man. During the Middle Ages it was grown and used throughout western Europe and The Romans regarded weld as

a color symbolizing purity. All parts of the plant may be used, except the roots, but the upper parts of the stalks with the leaves and flowers or seeds are the richest in dye potential. The plants may be used fresh or air dried for the future. Depending on the mordant used, colors range from yellow to gold to yellow green.

14) The leaves of the black walnut tree (*Juglans nigra*) have been a source of dye for many centuries. Leaves should be gathered in the late spring when they are fully developed and can be used immediately or dried. My most recent instrument was lightly tinted with black walnut leaves and a chrome mordant and I'm really satisfied with the results. The light gold dye enhanced the natural color of the satinwood bindings and the walnut back and sides took on a subtle mood while still retaining the character of walnut.

15) The annatto (*Bixa orellana*) is a small tree native to Mexico and Central America. The Spaniards found the Aztecs using this ("achiotl") and its use gradually spread to Europe, Asia, and Africa. Early manuscripts describe annatto as used for dyeing rattan, wood, varnish, cheese, and butter. It is fugitive when used alone but less so when combined with other dyes or locked up in a varnish. Helps bloom or heighten other dyes.

16) Bloodroot (*Sanguinaria canadensis*) is one of the first wildflowers to bloom in the northeastern U.S. It grows in the shade and thrives on rich, leafy Soil. Attaining a height of ten inches. The roots (rhizomes) are the source of dye material. Indians, basket makers, and woodworkers found it an agreeable dye early in U.S. history. It may be on the endangered species list in some areas but can be purchased from supply houses. Fades a little.

17) Black walnut leaves have already been discussed but far better known and used are the hulls which produce striking browns and blacks. The color is better if the nuts are gathered when they are fresh and green. Remove the hulls from the nuts and soak for 24 hours. The hulls are then boiled to extract the potent color. To get a very strong color the hulls are allowed to ferment first. Colorfast.

18) Cutch, a dye made from the heartwood or the Acacia or Mimosa tree, was used in India long before the birth of Christ. The trees are native to both India and the east Indies. To make cutch dye, the twigs are gathered when they are full of sap, the outer bark removed, then the wood is cut into pieces and covered with water. This is boiled until much of the water has evaporated and the mixture becomes thick with the sap. It is allowed to cool and harden thoroughly, then it is cut into blocks. When you buy it from a supply house, it comes in small pieces that are shiny and look like a shellac stick. Relatively good color fastness.

19) Alder (*Alnus glutinosa*), also known as black alder or European alder, was used in Europe during the fifteenth century as a black or brown dye. Indian tribes used the bark as a dye for basket materials, and the Eskimos used it for dyeing reindeer skins. The bark is very hard and should be broken into small pieces and soaked before using. Alder bark can be gathered from many locales in the North Americas or be purchased from supply houses.

20) Quebrancho is extracted from the heavy, dense wood of the Quebrancho tree. It is a natural source of tannin and is still used in the leather industry as a leather dye. A friend of mine in Argentina sent me some billets of this and if I thought Sandalwood was hard, I could hardly make slivers from this stuff. That's probably the reason the only way you find this offered is in extract form. Most of the heartwood dyes that come from hard woods and need a lot of soaking to yield color are offered in this form. The woody material is chopped and soaked, the solution vaporized into a heated chamber, and crystals of pure dye extract fall to the bottom. This process is similar to that used to make instant coffee. These extracts are very potent and an ounce will last you quite a while as they are concentrated.

MORDANTS - Most of these chemicals are very caustic so certain precautions should be observed when using them.

1) Use only in a well ventilated room to dispel any fumes.
2) Use rubber gloves and a smock or apron for protection.
3) Always add chemicals to solvent as there is less danger of adverse reactions.

ALUM (aluminum potassium sulfate) is a white mineral deposit that is a component of many types of rocks found in various parts of the world. Do not confuse this with the alum found in drug stores (aluminum ammonium sulphate), which will not give satisfactory results.

CHROME (potassium dichromate) is a bright orange crystalline substance that is very sensitive to light. For this reason it should be stored in a dark place and be kept covered except when you are actually measuring out the material. Whenever you use this mordant be sure and place the instrument outdoors or in another place where it can absorb a few rays of the sun for a few hours. Otherwise, once your carefully dyed instrument hits any sunlight later on the chrome may activate again (if it was dyed in a dark room, or artificially lighted room) and cause some unpleasant shifting of colors.

TIN (stannous chloride) are white crystals that are also light sensitive, but to a lesser degree than chrome. Take the same precautions as you would with chrome just to be on the safe side. Its main function is to brighten a color.

IRON (ferrous sulfate) is a light green crystalline substance that is also called green vitriol or copperas. Iron is known as a saddening agent because it deepens or darkens a color.

COPPER SULPHATE (blue vitiol) is a bright blue substance that can be purchased as either crystals or powder. The powder is preferable as it dissolves far more quickly than the crystals. One of the main uses of blue vitriol is an additive to change a yellow color to a definite green. It can also be used for a saddening agent at times.

TANNIN (tannic acid) is a light brown powder. It is found naturally in nuts, tree bark and sumac plants. Very versatile!

VINEGAR is used for its acetic acid content. White vinegar is preferred over other types. An alternative would be to buy a concentrated acetic acid solution from a photographic supply house.

BAKING SODA (bicarbonate of soda) is an alkali that is readily available in any
grocery. As an additive it can change a violet or purple color to blue.

OXALIC ACID, a white powder that is generally used to increase the strength or restore the dye potential of a red dyebath.

AMMONIA (ammonium hydroxide) - Clear non-sudsy, non-detergent ammonia is the best type and may also be found in the grocery. It is used to sharpen yellow or green dyebaths.

CREAM OF TARTAR is never used alone as a mordant but it will react with other mordants and change or improve the quality of various mordanted dyes.

PREPARATION
I've found that the simplest way to deal with the natural dyes is to place the stuff in a fine mesh bag made of cheesecloth or linen, then tie a string around the top like a teabag. When working with woods or barks, cut the material up into pieces or slivers, put in the "teabag", and soak for awhile. Usually you will have to add some heat to this solution to draw out the color but beware that most of these colors will shift or turn muddy if you use too much heat or boil for too long. Watch the pot carefully as this change will come on very quickly. Roots are first chopped before they go in the bag, leaves go in whole and are then crushed in the bag, seeds are put in the bag and then crushed with a hammer before they go into the dyepot. I brew my dyes the same way that I make chili; no measuring of materials at the outset but I go a little strong and if it turns out to be too much, then I water it down to the shade I want. Mordants are added to the pot a pinch at a time until the color starts to shift and like heating the solution, the color changes come on very quickly. Water is the usual solvent but most of the natural dyes will dissolve just as well in alcohol, and a few will color essential oils. In alcohol the colors tend to be brighter and in some cases what was red in water, will be crimson in alcohol, for instance. As for the oils, colors tend to be duller. Alexis, way back in 1550 noted that linseed oil will dissolve mineral and vegetable colors, but kill others and the same holds true today.

DYESTUFF	ALUM	CHROME	TIN	IRON	COPPER SULFATE
Madder	red	garnet	(+alum) orange/red	(+chrome) dull garnet	---
Hemlock	rose tan	tan	---	gray	
Cochineal	crimson	(+vinegar) purple	(+cream of tartar) scarlet	---	---
Sandalwood	red/orange	red/brown	(+cream of tartar) red	---	---
Brazilwood	crimson	purple	pink	---	(+alum) ruby
Alkanet	gray	---	---	---	---
Logwood	deep purple	navy blue	(+alum) purple	(+chrome) blue/black	black
Fustic	gold/yellow	deep gold	(+alum) bright yellow	---	green/yellow
Saffron	yellow	dull yellow	---	---	yellow/green
Tumeric	yellow	gold yellow	orange/yellow	dull yellow	green
Barberry	yellow	gold yellow	light yellow	green yellow	---
Weld	yellow	gold	bright yellow	---	(+alum +baking soda) green gold
Black Walnut Leaves	gold/yellow	gold	---	green	---
Annatto	orange	gold	(+cream of tartar) bright orange	---	---
Bloodroot	red/orange	warm brown	bright orange	----	---
B.W. Hulls	brown	---	---	dark brown	green brown
Cutch	---	(+copper sulfate) warm brown	---	(+copper sulfate) dark brown	
Alder	tan	golden tan	---	(+copper sulfate + tannic acid) black	brown

HARD-T0-FIND FINISHES FOR THE MODERN & OLD WORLD CRAFTSMAN