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Dyes in American Quilts Made Prior to 1930, with Special Emphasis on Cotton and Linen

James N. Liles

Even though cotton and linen (the cellulose fibers) were more difficult, time consuming, and expensive to dye than wool and silk (protein fibers), every conceivable color, hue, and shade was possible by the period 1750–1850. Indeed, many of the best dyes were available before 1630. The vast majority of 18th and 19th century dye manuals contained as many or more recipes for cotton and linen as for wool.[1,2,3] This undoubtedly reflects the increasing importance of cotton in Europe, and therefore America, after the 1600s.

Many of the early cotton and linen dyes were fairly fast to both washing and light while others were not so good. Much of one book, of several written in the 19th century, is devoted to the cleaning and redying of faded articles of clothing.[4]

Indian cotton calicoes, when first introduced into Europe in the early 1600s were quite justifiably considered one of the marvels of the world. By the late 1600s, imported printed cotton cloth for clothing became very fashionable in all of Europe. Wash and lightfast colors on these printed Indian fabrics included red, gray, black, purple-brown, brown, and blue. The yellows and greens were relatively fugitive to light owing to the use of turmeric for the yellow(s).[5] Cotton was the major fabric fiber in India from very early times. How early cotton dyeing occurred in India is not known, but fragments of mordanted yarn (for dyeing) were unearthed at Mohenjo Daro in the Indus Valley of India, dated roughly 2,000 BC.[6,7] Indian supremacy in cotton dyeing probably resulted from (1) early settlement, (2) a large population and labor force, (3) the presence of wild cotton and the best dye bearing plants, (4) a very intelligent people, (5) the presence of the necessary natural

mordants, (6) an unusual love of color, and (7) a philosophy of life which said if it takes a year to dye it right then let it take a year.

The later perfection of the completely washfast and lightfast Turkey Red process by Persian and Greek dyers in the Levant by about 1600 resulted in importation of large quantities of this material in Europe, especially thread for sewing and embroidery. This trade continued until well into the 1750s by which time the French finally unravelled all of the secrets of this very complicated Oriental process. In addition to the use of Turkey red, European dyeing and printing of cotton advanced at a remarkable rate from 1700 on, as the development of chemistry was at a more advanced state there.

Available evidence indicates that quilting materials used early on in America were mostly imported from Europe (England, primarily), and therefore of European, Indian, or Asian origin. A note to this effect from Brunswick Town, North Carolina (occupied 1726–1776) indicates that the cloth used for making clothing was virtually all imported from England. Bales of cloth from England were protected from possible theft by lead baleing seals impressed with the name of the city and the manufacturer. Archeological digs have unearthed a number of these lead seals, one with the impression "Lynch & Co., London."[8]

Virtually all of the professional dyers in America before 1840 or so were either trained in Europe or employed by those who had such training. These dyers preferred to continue using the dyes they were trained with in Europe.[9] Also, most of the available dye manuals in the 17th, 18th, and 19th centuries were written by Europeans, and if by an American, most of the recipes were copied from the European dye manuals. In addition, Europeans attempted to retain sales of their goods to us by imposing what was fashionable, thus inhibiting development and use of our own natural dyeplants.[10] Because other crops were more profitable in America, dye plants were not cultivated commercially during the 17th, 18th and 19th centuries except for indigo in South Carolina.[11]

The extent of home dyeing of cotton and linen in America prior to 1850 with native or imported dyes is not well documented. Native dyeplants would have provided golds and yellow-browns, off greens and green-grays, grays and browns. Most of the yellows other than black oak bark would have been rather fugitive to light.

That manufactured cloth, imported or domestic, was available at relatively early dates, even in the backwoods, is better documented. The Knoxville, Tennessee *Gazette* in 1796 advertised bolts of commercial cloth.[12] And in 1840 the Merrimac and Hamilton Mills in Lowell, Mass. produced more than 250,000 yards of cotton printed in madder colors.[13] Indeed, James Franklin (brother of Benjamin Franklin) is reported to have dyed and printed calico in America in the 1720s, and indigo-blue resists were produced during the 18th century.[14,15]

My interpretation of the preceeding is that most of the dyed quilting materials up until at least 1800 came from commercially produced cloth, and all of the printed cloth from settlement to 1930 was commercial.

In 1856 William Henry Perkin, an English chemist, produced quite by accident the first synthetic dye, mauvine, from Aniline, a coal tar product. This important discovery marked the beginning of the end for most natural and mineral dyes. Indeed, discovery of new synthetics was so rapid that except for isolated areas such as the Southern mountains, and during World War I when German synthetic dyestuffs were cut off, only about fifteen natural and mineral dyes were still commercially profitable by the turn of the 20th century. The early synthetic dyes, though possessing rather poor lightfastness, produced more standard, predictable colors than natural dyes, and were cheaper and easier to apply. On the other hand, one general characteristic of the older natural dyes was that they usually faded true—becoming lighter and often more mellow with time. This was not true of the early synthetics and some of our modern synthetics. Many early synthetics turned rather hideous colors when faded, not resembling the original color at all. Several thousand different coal-tar dyestuffs had been produced by 1925, with perhaps 100 or so fast to light and washing.[16] Many of the poorer dyes were used only for a few years, never to be produced again. Far more of these dyes were used for wool and silk than for cotton and linen.[17]

In America the first packaged dyes were put on the market by Howe and Stevens in 1863. These were various natural dyestuffs ground to a fine powder and mixed with a ground mordant. By 1864, however, five of their "family dye colors" were imported European synthetics, including magenta and mauve. Again, these

were less adequate in cotton than wool, but by about 1880 packaged synthetic Diamond dyes could be bought at every drugstore and country store in the most remote parts of the United States, and some of these were reasonably good cotton dyes.[18] Of course, collecting plants such as goldenrod, black oak bark, and sumac was much cheaper!

The dyes

Red: The very best, fastest, and most sought after red from 1600 to 1930 was Turkey Red, and the simpler madder reds were inferior only in brilliance and complexity of color. Several plants of the family Rubiaceae (madder, chay, morinda) contain the principle dyeing ingredient which is known as alizarin. Indian dyers probably produced fast madder reds by 2000 B.C., and they may have developed the Turkey Red process also, though this is usually credited to the Persian, Turkish, and Greek dyers along the area of the Mediterranean known as the Levant in about 1600. The process was much more complicated than simple madder red. It originally involved some 13–20 tricky steps over a three to four month period. Ingredients used in various of the steps (from 1600–1880) included madder, cattle, sheep, or camel's dung, rancid olive oil, castor oil, sesame seed oil, or lard, soda ash, tannin, alum, chalk, and often blood. The brightening process which produced the brilliant, fiery shades included boiling for several hours under pressure with soap solutions, and often tin salts. Even the best dye houses had reasonably frequent failures. Turkey Red was expensive, but it would last until the cloth was in tatters, and it did not fade or bleed out on surrounding white areas.

So complicated was the process that it took literally every country in Europe 150 years to steal away and master this Oriental process. The French were first, in 1750. The color has been variously described as a soft blue red with inner glowing fire and as shades from sombre to luminescent. By 1900 the process had been shortened to about seven days, but with quite elaborate equipment and slight sacrifice in fastness. It is the most complex of any dye known, ancient or modern, and its entire chemistry has never been totally elucidated, mostly because it was entirely replaced by the fast vat and developed reds by 1940, at which point further study of its

chemistry ceased. It went under the names Turkey Red, Levant, Rouge turc, rouge des Indes, Adrianopolis, and Adrianople Red. Adrianople, an ancient Turkish city, was a major center for its production.

Because of the time and expense in producing Turkey Red, some other very pretty fancy reds were also used, though rather fugitive to light. I cannot help but think that some of them showed up in quilts, and they were probably relatively satisfactory for quite a few years if in the bedroom of a dimly lighted cabin. The safflower colors faded true, but the red woods fade to a reddish brown. The redwoods include Brazilwood (peachwood, Nicaragua, sappanwood, Pernambuco, Fernambouc, Bois de Bresil), and Barwood (Camwood, Sanderswood, sandalwood). The best way the redwoods were used was to combine them with common madder red, and this produced a good and lasting red. The excellent cochineal, kermes, and lac reds (insect dyes), were much used on wool and silk, but rarely on cotton and linen. Fugitive reds included annotto, pokeberries, and bloodroot. Annotto (reddish-orange) fades rather true.

Some old quilts may show considerably more brown colors than they contained originally. Not only do the redwoods fade to a reddish brown, but so do some of the early synthetic dyes produced from 1860–1900, such as neutral red and Congo Red. Another early aniline red, magenta, fades to a rather ugly purple-brown. Congo red was discovered by Boettger in 1884, and it was a very easy to use, cheap, direct dye. It dyed level and a faded article could be easily redyed. Because of this, many Indians (India) turned to it and away from British produced Turkey Red, depressing the industry, particularly in Manchester, and putting thousands of people out of work.[19,20]

From 1870–1930, several somewhat fugitive commercial and home dyes were pawned off as Turkey Red. For example, Ramsey reported the story of a Georgia lady buying Turkey Red powder at the store in Calhoun. The time was between 1873–1907.[21] The "Turkey Red" powder was probably Congo Red.

Between 1910–20 the brilliant and fast anthraquinone vat dyes were developed, including red, and these were available in America after World War I. Also, a very good developed red, Paranitraniline red, a naphthol dye, was in commercial production by 1918, and much used in place of Turkey Red by 1920.[22] It produced an ex-

cellent bright shade of red, somewhat more yellow and less blue in tone than Turkey Red. Occasionally methods were used to make it bluer in tone. The color was extremely fast to washing, and it did not bleed into interwoven white when scoured in hot soap solutions. Vat reds at this time were also fast and brilliant, though they did not possess the complex beauty of Turkey Red. Thus, fast non-fading brilliant reds from 1918 or so on included Turkey Red, developed red, and vat red.

By 1928 at least 100 synthetic red dyes had been produced, but only about four or five passed all tests of fastness.[23]

Blue: Properly executed, the number one blue dye during the period of this paper as well as for probably the last 5000 years is indigo. The earliest dated specimen may be a fragment of dyed linen from Thebes, dated about 3500 BC.[24] Indigo is still used for the finest Japanese kimonos, African textiles, fading blue jeans, and by modern fiber artists. Indigo may be used to dye full pieces, and it can also be printed.[25,26,27] Indigo may be dyed on cotton and linen from the palest blue to almost a purple black, and it is quite fast to washing and light except in the palest shades. Indigo is, and always has been an expensive dye, and it takes some experience to use well. At one point in the 18th century indigo cost $2.25 per pound, while logwood cost only six cents per pound.[28] Therefore, the temptation for the home dyer to use logwood blue in cotton and linen must have been great. Logwood blues are pretty, newly made, but they are fugitive, fading to a light pink-purple. After 1820–30, Prussian blue, a mineral dye, became available in America. It was produced first by Mauvier in France in 1753, and rediscovered in Germany about 1800. Like all mineral dyes, it was used in fabric printing. Prussian blue was also called Napolean's blue, and Berlin Blue, and its various shades had names, such as sky blue and royal blue. It is quite lightfast and relatively wash fast unless treated with very alkaline laundry soaps. If destroyed by repeated washing the remaining color is iron buff (reddish brown). None of the early synthetic blues for cotton and linen were very good until about 1920. Rather satisfactory synthetics of this period included methylene blue, toluidine blue, New Diamond Indigo Blue, and Indanthrene blue (a vat dye).

Yellow: Clear, clean yellows on cotton and linen were a problem up to about 1840 with none showing excellent lightfastness. The best of this period included weld and old fustic, and by about 1800 American black oak bark. Weld and black oak bark were the most lightfast of the old vegetable yellows. Other home dyed yellows of the period could include peach leaves, white aster, goldenrod, coreoposis, smartweed, whiteash, barberry, osage orange, marigolds, Queen Anne's lace, broom sedge, Persian berries (used in calico printing) and many others. If the dyer were willing to accept a golden tan, or yellow tan, the color would be more lasting. The same dyestuffs were used, but more tannin (brownish) was used in the mordanting. Indian calico yellow, as well as greens (yellow overdyed with indigo) usually contained turmeric for the yellow. Turmeric dyes directly, i.e., without a mordant, and is a very clear yellow. However, it is a fugitive to light, and calico leaf prints, originally green, would become blue eventually as the turmeric faded out. In fact, many old tapestries, coverlets, quilts, etc., show more red, blue, and brown than they originally contained, and less yellow, green, orange, and gray.

Potassium dichromate (chrome) produced in 1797 made possible the production of the clear, clean, brilliant mineral dye known as chrome yellow. It was produced commercially in America by about 1840. Chrome yellow is quite fast, but it is also poisonous, and was so particularly to factory workers producing large yardages of the material. The dye was used in commercial production until about 1910.[29] It was also used to color paper, and our "Greenback dollars" were dyed with chrome green (Prussian blue overdyed with chrome yellow) from about 1850–1900.[30] It can be discharged, as is the case with all mineral dyes, and so could be used in calico printing. Unless exposed to heavy concentrations of coal smoke, chrome yellow remained bright, but because of its poisonous nature would have been replaced by early synthetic yellows if they had been any good. Napier's book (1875) listed no recipes using synthetic yellow dyes for cotton and linen.[31] Fast vat synthetic yellows became available shortly after the end of World War I as did fast sulfur yellows.

Brown: When it comes to brown, tan, fawns, and olives, the traditional cotton dyes were nearly as fast as the best of our modern

dyes. Indian cutch, in my opinion, surpasses the modern dyes in beauty. This dye is obtained from the Indian acacia tree *(Acacia catechu)*. It is sometimes referred to as catechu or Bombay or Bengal catechu. A similar substance is obtained from gambier *(Uncaria gambir)*.[7] Cutch was used in Indian calico for centuries and was in use in European printed cottons by about 1800. Cutch was still used in commercial American dyeing until about 1930. Other very good natural brown dyes on properly tannin-alum mordanted cotton and linen included black walnut or butternut hulls, and alder or red maple bark, and many home dyers produced a reasonably good brown with tea. Fast natural brown was also obtained by dyeing iron mordanted material with madder (this can also produce gray).

By 1850 or so manganese bronze (bistre), a mineral dye, became available and was used until 1910 or slightly later. Shades from light bronze to full seal brown could be produced, and they were fast. This material was also used as a gunstock stain. Mineral khaki became available at about the same time. It is a mixture of chromium and iron oxides. Synthetic sulfur khaki appeared in about 1912, just in time to replace mineral khaki of our army uniforms. (All mineral dyes roughen the fabric, at least slightly.)[33]

Bismark brown, a synthetic aniline dye produced in the late 1860s, while quite beautiful newly made, was not lightfast. Good synthetic sulfur and vat browns were available by 1930, but the easier to use direct browns were not so good, particularly to washing fastness, though by this time they were fast to light.

Gray, black and steel: The gray and black dyes from antiquity until nearly the beginning of the 20th century were iron tannates, i.e., fibers treated with iron salts and vegetable tannins as from sumac, hemlock, or galls. Properly done, these grays and blacks often lasted for years, though they could revert to a rusty color if subjected to excessive exposure and sunlight. By 1600 logwood from Central and South America was often added along with iron tannate producing a blacker and sometimes more permanent color. Properly mordanted with chrome, logwood was used to dye inexpensive blacks on wool up to about 1940.[35]

Iron mordants do cause premature deterioration of natural fibers somewhat, and this is even more true of silk than cotton. Sometimes an old quilt will show disintegration of gray or black material

while the remainder of the fabric is sound. Mordanting or weighting with tin salts also produces this effect.

Good natural blacks were also produced by dyeing black walnut over deep indigo. This produced a nice dark permanent purple-black. Also, the three primary colors were often combined to produce black, i.e., madder, fustic, and indigo. Synthetic aniline (coal tar) black dates back to 1863.[36] It is formed by oxidation of aniline on the fiber being dyed, and was a very fast black on cotton, and used especially for calico printing. If the oxidation of the aniline was not complete, the fiber eventually turned green, but this was a problem only with the earliest product. Thus, many good, fast blacks and grays were available before 1930.

Compound Colors: Prior to the advent of synthetic dyes, most greens, oranges, and purples were produced by overdyeing one color with another. Thus, most greens were produced by overdyeing indigo with a good yellow dye or vice versa. Few of these cotton greens were satisfactory for long exposure to light; old fustic, weld, and black oak bark generally were the best, though turmeric was also often used. Mairet considered vegetable cotton greens unsatisfactory for the home dyer.[37] A very fast mineral dye or mineral-natural combination appeared about 1840 and lasted until probably the 1920s since it withstood exposure so well (it was also used for outdoor green awning material well into the 20th century). This green dye was either prussian blue or indigo overdyed with chrome yellow. Obviously, these greens would hold up very well in quilting materials. Greens were also produced by overdyeing fustic with Prussian blue, but these would not be as lightfast as the chrome greens. Synthetic aniline greens were listed in dye manuals by 1875, but the early products were not particularly fast to light or washing. However, by 1920 several good developed and vat greens were on the market.

Orange: A rather beautiful natural orange on cotton was gotten with annotto, obtained from a South American plant, but it is very fugitive to light. It did fade true, but very rapidly. This same dye was also used to color butter and cheese, and our early terrible looking white oleomargarine during World War II. Even so, I imagine

annotto was occasionally used in early quilting materials because natural oranges are sadly lacking. Compound oranges produced on cotton and linen with madder and a yellow dye would eventually fade mostly to the red. This was not the case with wool dyed the same way. The most permanent oranges, prior to good synthetics were antimony orange and chrome orange which became available between 1820 and 1840. This was produced by heating chrome yellow in an alkaline solution. As is true of most of the other colors, really good synthetic oranges did not appear until about 1920.

Purple: Beautiful natural purples on wool were gotten by dyeing with cochineal red and then overdyeing with indigo. Cotton, however, does not take cochineal well and madder red-indigo purples, while fast, were not so outstandingly pretty. Another early and fast Indian purple (later called Egyptian purple) was produced by mordanting with both iron and alum and then dyeing with madder. The color is sort of a purple-brown. Cotton dyed in very deep shades with indigo alone produced a very striking violet purple, and getting this effect depended partly on the skill of the dyer. Prussian blue (sky blue shade) overdyed with safflower pink produced a beautiful lilac and, in spite of the fugitive nature of safflower, this dye is listed in dye manuals as late as 1885.[38] In compound form the safflower fades more slowly than when present alone. Tin mordanted logwood cotton purples were also used from the 1600s to the 1880s. These were also quite pretty, but fugitive both to washing and light, fading to a light pink. I feel quite certain, though, that I have seen faded logwood purples on both old quilts and coverlets. Again, fast synthetic purples were not available in America until after World War I.

Finally, in discussing compound colors, it should be pointed out that sometimes a natural dye was combined with a synthetic, or two or more synthetics were combined![39] Any and all methods were employed to get just that correct shade or improvement in fastness. Many of our modern dye colors could be much more beautiful if this soft of effort and expense were more frequently expended.

The dyes discussed in this paper cover the period from the colonization of America to 1930. In conclusion I might add that I have spent the past five years researching and reproducing these traditional cotton and linen dyes, as well as a few of the early synthetics.

Work on Turkey Red alone has been in progress the entire time, and only now do I feel that my product is satisfactory in all respects. I do not regret a single moment spent in this work. Seeing the colors, newly made, has impressed me with the fact that the traditional dyes were "good enough." Indeed many of them far surpass our modern dyes in sheer, subtle beauty, if not in fastness. But then who knows what our modern quilts will look like 100 years hence? No dye is completely fade resistant. As to beauty, the natural dyes are not pure colors, thus they rarely clash when placed side by side. Proper mixing of modern dyes could effect the same result, but this is all too seldom done. The fact that human beings would spend three or four months to produce a suitable dye simply illustrates that food, shelter, and clothing are not enough—color is also necessary!

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