

# MADDER

## A MOST MEDIEVAL DYESTUFF



Jost Amman colored woodcut "The Dyer"

*Professional Dye Houses typically did "piece-dyeing" of whole cloth, the process here appears to be indigo dyeing, based on the blue color used in the woodcut and the sliding of the cloth from the vat, up over the peg, exposing the dye to the air, then back into the vat to pick up more dye.*

By Baroness Ysabeau Ferch Gwalchafed

“Next to indigo, madder was the most used dyestuff in ancient times. Many scientific investigations and antique sources document this fact.” (Sandberg 1997). For example, Tutankhamen’s gravesite, famously excavated in 1925, contained a woven belt that was analyzed to contain purpurin and alizarin, the primary pigments contained in madder.

This belt, dated to the 18<sup>th</sup> dynasty (1500-1350 BCE), is significant not only for its very early use of madder, but that textile researchers concluded from the low fastness of the dye that the Egyptians had not yet mastered the technique of mordanting. A Coptic piece dated to the 400s has been analyzed and determined to be dyed with madder and a mordant, but the mordant is iron. Analysis on Viking textiles indicated that culture was using Alum as a mordant, but the plant material used for the red dye was not madder, but bedstraw. Textile excavations around London that date to the 1400s clearly show both madder and alum being used together, but it seems reasonable to presume the practice was well established before this date.

In 1987, a total of 351 samples were taken of various textiles from medieval sites around London and subjected to dye analysis. The samples came from deposits dating from the 12<sup>th</sup> to 15<sup>th</sup> century, but the largest group was dated 1330-1340 and came from Baynard’s Castle. Use of chromatography allowed scientist to identify the presence of alizarin and purpurin, the main components of madder. Of the 351 samples tested, 220 (or 63%) contained an identifiable dyestuff and madder was identified in 45% ( 134 of 299) of the samples collected at Baynards Castle. “In seven cases, the dye had been combined with blue to give purple or black...and in a wool cloth some madder dyed threads in the selvage had been over dyed with a yellow (dye) to form an orange or brown selvedge stripe in a yellow cloth.” (Crowfoot 1992)

It is also important to note that murex purple, well known to the Phoenicians, is unknown. Researchers “found that purple’s coloristic counterpart was always produced by combining a red dyestuff, most often madder, with a blue, always woad-indigo.” Therefore in addition to the large samples uncovered in the 14<sup>th</sup> London excavations, once can also include colors achieved with overdyes, such as orange, brown and black, madder was present in more than half of the samples tested. Clearly, madder was vital to the medieval dyer’s trade.

Research to date suggest the concept of using a metal salt as a mordant combined with madder began either in ancient India or ancient China, but conclusive dating of the first evidence from either country has yet to be conducted. What is more interesting and useful to those studying medieval era is madder’s nearly omnipresence, thanks in part to the Greek and Roman cultures.

In his *“Historia Naturalis”* Pliny names the plant from which a red dye is extracted as “Rubia.” The description corresponds to the modern, cultivated form, known as *rubia tinctorum* some centuries later.” The first of these is *Rubia*, the use of which is necessary in dyeing wool and leather. The Italian type is the most valued and in particular that which grows in the areas around the city Rome....It grows wild, but is suitable for cultivation.” During the rise of the Greek, and later Roman empires, it is likely that members of the *Rubiacae* family were transplanted around Europe and Asia. The Roman physician Dioscorides reported it was cultivated in the Cyrene (a Greek city-state turned Roman province located near modern-day Shahhat, Libya). Other forms of madder, such as *rubia cordifolia*, and *rubia khasnia*, give an ever deeper tone and are collectively known as Munjeet or East Indies madder.

“Large scale cultivation of madder has taken place in Europe ever since the Middle Ages. It first arrived in France through a decree of Charlemagne in the 800s which dealt with a common type of madder--- *rubia tinctorum*” (Sandberg 1997). In general, the cultivated madder plant prefers a limy soil, and the plant must grow a minimum of two to three years to develop enough root material for harvest. Crowfoot differs in opinion, stating that *rubia tinctorum* has been introduced before the Norman Conquest to England, and was being cultivated in the Anglo-Saxon period. However, Crowfoot also notes that there was no madder dye identified in the 12<sup>th</sup> and 13<sup>th</sup> century textile samples, but present from the 1330s onward. Further, all samples contained alizarin, which is present in high concentrations in *rubia tinctorum*, but not in the native *rubia peregrina* or any of the bedstraw, or *gallium* species.

Tests on samples taken from Bristol and York sites showed that the amount of alizarin and purpurin varied considerably from sample to sample, suggesting that either the type of dye harvested, or the ratio and/or the ratio of dye to material used were not consistently controlled.

For harvest, the plant is uprooted and allowed to dry in the field for one to two weeks to air out. Stems and leaves are removed then they turn yellow, and the roots are placed outside the drying house. After a few days they are placed inside the drying house. This house is a stone building with an oven and piping that go from all sides to distribute the warm air. The harvested roots are laid at the bottom of the house, and then moved to higher and higher racks within. This process can take up to a week, depending on weather conditions, but some dye books suggest air drying alone produces a superior product.

Once dry, the roots are threshed to loosen the husk, earth and other debris. From there, the remaining roots are taken to the stamp house where it is sorted by size and sifted through coarse and fine sieves made of calf leather, in a closed and well insulated room so the resultant powder is not lost.

The powdered madder is then stored for one to two years, which was believed to improve potency. It was believed to be best when the powder was a saffron color and gives off a strong, but not unpleasant, odor.

Presumably because of these conditions, the Nordic countries, however, used the Gallium species to obtain their red colors. Confusingly, this “dyers bedstraw” was known in Finland as “mattara.” Viking excavations and research in Oland and Gotland indicate that gallium boreale or white bedstraw was used to dye wool red using an alum mordant.

Because of the volatile nature of the pigments, particularly pseudo purpurin, madder dyeing is done using a relatively cold process. “If one wants to obtain the most brilliant colors possible from the madder family, the dyestuff should never be subject to temperatures higher than 70C, whether drying the roots, during extraction of the dyestuff in the bath (over boiling), in dyeing, or during treatment afterwards.

Additional factors that affect the final color produced include the water quality (hardness, pH values), and the material that the dyeing vessel is made from (Copper, Iron, non-reactive).

Also, the medieval dyer had to deal with “forgeries” or impurities added to the madder powder that reduced potency. Small batches of test dyes were usually conducted before the sale was completed. Common impurities used include brick dust, sand, and dyed sawdust.

Despite all these hurdles, recipes appear in the late medieval period to promote consistent dyeing results. Both Gervase Markham’s “The English Housewife” (1615) and Gioanventura Rosetti’s “Plichto de Larte de Tentori” (1548) give madder recipes using alum mordants. In Markham’s recipe “shall you put to your 10 pounds of wool, a pound of alum, then heat your liquor again...and let it boil a space of an hour, then take it out again.” (Markham 1998 ). Rosetti’s recipe calls for approximately 250 grams of madder for each kilogram of wool or a 1 to 4 part ratio. To achieve what Markham calls “a perfect red” a pound of madder to 10 pounds of wool, or a 1 to 10 part ratio.

During most of the Middle Ages, dyeing was done mostly by the piece, not as yarn or fiber. “Most cloth was colored, that required the intervention of the dyer, who seldom treated wool before weaving for

fear of producing a mottled fabric.” (Delort 1973) Markham preferred to dye wool as raw fiber, since this then allowed the spinner the ability to mix fibers into custom colors. It is also believed that dyeing at the fiber stage gave a more consistent color. Rosetti’s book only discusses piece-dyeing, or dyeing the whole cloth, which is often depicted in woodcuts such as “The Dyer” a colored woodcut by Jost Amman (1539-1591).

For today’s dyeing class, we will be using wool, and wool-silk blend yarns, and conducting the equivalent of a proof test of the dye because of limited material and supplies, relying primarily on the Markham recipe, but scaled down using guidance from modern natural and home dyeing references. Dyeing in the middle Ages was done on a massive scale, with dyers forming guilds and locating their workshops in the area of town most conducive to their work, i.e. near a water supply, on the edge of town to control odors, chemical accidents, etc. The intent of this class to provide the student with as test sample dyed in a period manner to use in evaluating and selecting modern textile colors for reproduction purposes.

## Bibliography

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