

CHAPTER 5
HISTORY OF DYES AND THE DYEING INDUSTRY
IN THE OLD WORLD

For over three hundred years, huge and profitable quantities of cochineal were being shipped from the New World to the European markets. A digression is needed to explain this phenomenon and set the stage for the arrival and acceptance of this superior red dye in Europe. To accomplish this task, a brief history of the use of dyes in the ancient world, along with a history of the development of the dyeing industry, is provided.

History of Ancient Dyes

As early as 1,500 B.C., the mummies of Egypt were wrapped in linen strips dyed blue with either indigo or woad. These wrappings, although 3,500 years old, still retain their blue color. In Greco-Roman times, the woad plant was used as a blue dye, while red cloth was achieved with the use of the kermes insect. One precious animal dye with a glorious history which became available for home consumption in Crete in 1,600 B.C. was Tyrian purple. This popular dye brought prosperity to Tyre from 1500 B.C. until the Arabs' conquest in 638 A.D. (Leggett 1944, p. 64).

Earliest recorded history clearly reveals that dyeing is an ancient craft. Some of the oldest reports can be found in the Book of Exodus, 25:4, 5; "the Lord said to Moses, tell the Israelites to collect for me violet purple and scarlet yarn, rams skins dyed red.....," and from Exodus 26:1; "...sheets woven of fine linen twined and of violet, purple and scarlet yarn (scarlet from kermes, called scarlet berry by the Greeks), and in the book of Isaias 63:1, 2; "What is this that cometh from Edom with dyed garments from Bosra....."

Why then is thy apparel red and thy garments like theirs that tread in the wine press?" This passage suggests that a wine stain upon the skin, garments, etc., may have planted the idea of using a substance to change the color of cloth (James 1974, p. 65; Neuburger 1930, p. 186-190). Three coloring substances are mentioned in Old Testament - purple (dyeing substance not given), kermes under the names "tola" or "tola shami" (tola, worm, shami, bright red dye) , and madder (frequently used under the name rubia) (Leggett 1944, p. 71; Neuburger 1930, p. 168).

One of the oldest and most sought-after scale insect dyes was the beautiful oriental kermes which was made from the scale insect Coccus ilicis, which lives on a subtropical species of oak (Diehl 1972, p. 25). Kermes produced a much-desired scarlet color. Textile fibers dyed with kermes have been found in a Neolithic grotto of Adaouste in Bouches-du-Rhône, France. The fibers were found together with food-remains on a dish consisting of barley, meat, and kermes (Forbes 1956, p. 102). Kermes use is recorded as early as 1727 B.C. (Robinson 1969, p. 25). It grew in popularity as the highly prized purple shellfish dyes of the Mediterranean decreased. This color was so prized by the Romans that scarlet dyes were frequently exacted as tribute from a conquered nation (Leggett 1944, p. 75-78).

Scarlet took on religious significance around 1467, when Pope Paul II decreed scarlet as the official color of the cardinals' robes (McNeil, ed. 1990, p. 200). The crimson of the cardinals' robes was produced by dyeing cloth with kermes and alum. Around 1630, the word "scarlet" was given to the color produced by dyeing cloth with cochineal and a tin mordant. This color was more beautiful than the scarlet of kermes and became known as "Venetian scarlet" (Tregrove 1970, p. 335).

Kermes was shipped to Venice in the form of a reddish-brown ball about the size of a pea. The pea-size grains were shipped in tubs or crates and due to the size were known as "grain" (in Latin "granum" means seed) because of the similarity to small seeds. Grain,

a name of great antiquity, indicates the red coloring matter in the dye of kermes and "ingrain" is an abbreviation for dyed in grain. This word "ingrain" is used by one of the characters in Shakespeare's "Twelfth Night" when he exclaims, "Tis ingrain, Sir! twill endure wind and weather" (Leggett 1944, p. 79-80).

Ancient Dyes In the Old World

Despite the huge array of pigments available as dyestuff, many dyed fabrics did not withstand washings and sunlight successfully. Because of this and other factors such as scarcity and prohibitive cost, dyers were restricted to using a dozen or more pigments with a narrow range of colors (Leggett 1944, p. vi). Among the more successful dyeing substances, called the ancient dyes, was weld, fustic madder, kermes, lac, indigo, walnut, and cutch (Wipplinger 1985, p. 51). With few exceptions, dyers used this limited number of natural dyes, with the addition of logwood, brazilwood, and cochineal after the discovery of the New World, until the advent of aniline dyes in the second half of the nineteenth century (McNeil, ed. 1990, p. 199).

History of Dyeing Industry

Commercial dyeing is known to be one of the most ancient technical arts (Neuburger 1930, p. 186). The word "baptein" (one of the sources from which the modern word "baptism" is derived, Gr. baptisimos) was used by the Greeks for the immersion of fibers or cloth in the dye solution (Brill 1956, p. 131).

Very primitive dye shops, similar to those of ancient times, can still be found in many parts of the Third World. In Senegal, West Africa, faded Muslim robes are dyed to restore their original color. The robes are dipped in huge vats of dye, rinsed, and laid in the sun to dry. In China, primitive dye-shops can still be found which are identical with those described in the literature from ancient times (see Figure 8; Brill 1956, p. 131).

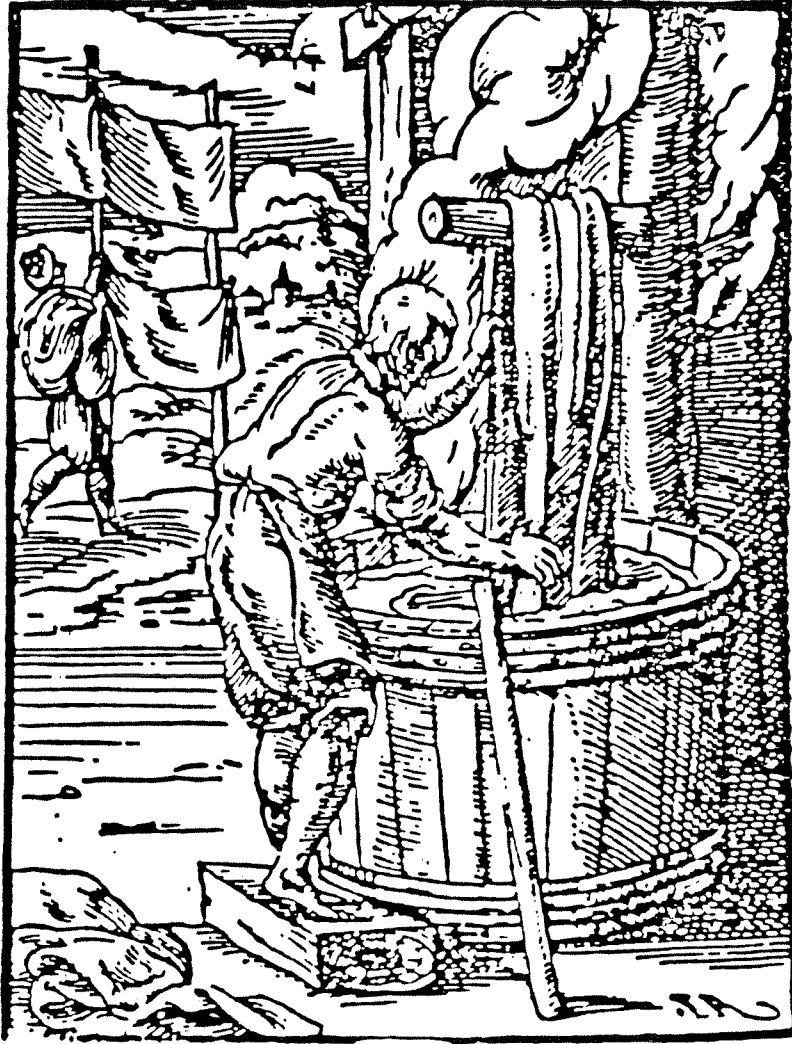


Figure 8. Woodcut of sixteenth-century dye shop by Jost Amman (1539-1591).
Source: Leix 1937, p. 7.

The history of dyeing begins as early as 3,000 B.C., when processes for dyeing fine fabrics, principally linen, in a full range of hues had evolved. The dyeing industry no doubt originated in remote times in China before 3,000 B.C. (King, 1985, p. 177). By 3,000 B.C., dyeing was a well-developed art in Mesopotamia, India, China, Japan, Persia, and Egypt (Weigle 1974). The Egyptians had become advanced in dyeing textiles in an array of primary colors, and both the Chinese and Japanese dyers had produced a large range of natural pigments, as evidenced by the surviving specimens of richly colored silks carried into Europe along the famous Silk Route (Encyclopaedia Britannica 1974, vol. 5, p. 679). The Phoenician dye industry began in 1,500 B.C. and was famous for the purple dye extracted from shellfish called Tyrian purple (King 1985, p. 177). Phoenician and Alexandrian merchants exported dyestuffs to Greece and other parts of the known world, where knowledge of how to prepare and use dyes spread by way of Italy throughout Europe (Robinson 1969, p. 20).

Dye Shops

The very first dye shops probably originated in the New Kingdom of Egypt around 1500 B.C. as the art of the dyer became as important as that of the weaver. At that time, both weavers and dyers worked under the most unfavorable social conditions. A quotation from Papyrun Anastase states, "The hands of the dyer reek like rotting fish and his eyes are overcome by weariness." The eyes were no doubt burning from the common practice of using urine in the dyeing process (Robinson 1969, p. 15).

During the Dark Ages, almost all knowledge of dyeing was lost in Europe (Tregrove 1970, p. 331), but by the high Middle Ages, dyers-guilds were in existence and had sprung up throughout Germany, Britain, France, Flanders, and Italy. Italian cities, such as Genoa, Lucca, and Venice, contained flourishing dyers' guilds. The famous "Plictho de Larte de Tentori," published in 1540 by Giovanni Ventura Rosetti, contained the recipes of the Venetian Dyers Guild, becoming the standard work of reference for dyers

until the end of the seventeenth century (Robinson 1969, p. 28). One of these guilds, the Dyers' Guild of Venice, the "Mariegola dell'arte dei Tintori," developed and recorded specific recipes for dyeing fabric (Encyclopaedia Britannica 1974, vol. 5, p. 679).

Dyeing with Natural Dyes

Dyeing with natural dyestuff is a very involved, messy, labor-intensive, and time-consuming process, complicated by a great many problems in both obtaining and processing the dye. Many natural dyes require large quantities of raw material to produce the dye and obtain the desired results. Additional chemicals are needed to intensify the color or render the fabric light fast, and many natural fibers have no affinity for dyes unless the fibers have been treated with aluminum, iron, or tin compounds (mordants) to render the fiber ready to receive the color (Encyclopaedia Britannica 1974, vol. 5, p. 679).

Other problems associated with natural dyeing related to the dyeing substance. One example was the use of iron oxide to achieve a black color. If the iron oxide content of the oak apple was too high, the dyed wool was likely to be damaged. For this reason, some old carpets show the most wear in the areas of the rug woven with oak apple dyed yarn. Another problem arose from dyeing with indigo, which had to be fermented for a protracted period of time to liberate the dye in a soluble, colorless form before cloth, steeped in a dyebath of indigo and exposed to oxidation, would turn blue (Encyclopaedia Britannica 1974, vol. 7, p. 407).

Europe had come through the colorless Dark Ages and the people were anxious to wear color. This put a demand on the dye shops which were limited by both supply and difficulty in the colors they could produce. For these reasons, the dyers were anxious to acquire any new and possibly superior dye, especially a scarlet dye whose color denoted position and prestige. Many of the dyes in use remained scarce until the discovery of the passage to India. After that time, large quantities of natural dyes became available on the European markets (Leix 1937, p. 20).

It was to this environment, in the first half of the sixteenth century, that the newly discovered scale insect red dye cochineal was introduced. Before cochineal became available, the dye used to produce red and scarlet was derived primarily from kermes. The color was a prized hue of the Europeans who were anxious to wear red clothing, and it was not long before the superior cochineal red dye replaced kermes.

Chemistry of Dyeing

The discovery of using a tin mordant in the cochineal dyebath in 1630 resulted in the most beautiful scarlet dye ever found (Tregrove 1970, p. 335). The discovery was made when a well-known chemist, Cornelius Drebbel, placed a solution of cochineal made for the purpose of filling a thermometer in his window. A small quantity of aqua regia dropped into it from a broken glass container, and the cochineal solution transformed from purple to a beautiful red. Drebbel discovered that the aqua regia solution had dissolved some of the tin which divided the window panes. Drebbel gave this discovery to a dyer named Kuffelar, who perfected the process and kept it a secret for his own dyehouse. The shades this process produced became known as "Kuffelar's colours." With this great discovery and the advances in scientific method, attempts were begun to apply chemistry to the art of dyeing (Tregrove 1970, p. 331).

Two centuries later, in 1856, William Henry Perkin, then only eighteen years of age, rigged a home laboratory. By accident, Perkin discovered a synthetic dye, which he named Mauveline. Soon after, Mauveline was shortened to mauve and the first name was given to a synthetic dye. Before long, Perkin had set up a factory in north London and from that time, use of natural dyestuff was drastically reduced (Hobhouse 1985, p. 25-26). The speed at which natural dyes were replaced throughout the world was the result of their low cost, reliability, and ease with which they could be used. The economic impact of the use of aniline dyes destroyed the cochineal industry.