

Dyeing. Dyeing is a subject not involving much machinery, and is therefore hardly within our limits.

Dyes are organic and inorganic.

The former are vegetable, except cochineal, sepia, and the purple of the murex.

Most of the vegetable colors do not exist naturally in plants, but are obtained by subjecting vegetable substances to special chemical treatment; as in the case of *garancine*, obtained from madder.

The art of dyeing consists in impregnating fiber, in the state of cloth or otherwise, with coloring substances.

Fibrous materials differ in their relative disposition to *take* color. Their disposition to absorb and retain color is in the following order, beginning with the one which has the greatest attraction for color:—

Wool.	Flax.
Silk.	Hemp.
Cotton.	

Woolen goods dyed before weaving are called *wool-dyed*; if after weaving, *piece-dyed*.

Dye-colors are *substantive* or *adjective*.

The former act directly, imparting their tints by simple immersion in their infusions or decoctions; the latter intermediately, and are the more numerous, requiring *fixing* or *striking*.

The intermediate substances are called *mordants*.

The mordant is first applied, and causes the dye which follows to adhere to the fiber, often singularly affecting its tint. Thus: cotton dipped in a solution of copperas (*mordant*) and then in a solution of logwood (*dye*) becomes black. If a solution of tin (*mordant*) be substituted for the salt of iron, the tint imparted by the logwood will be violet. Mordants were used in China and India from very distant periods, and are described by Pliny. See CALICO-PRINTING.

Moses (1490 B. C.) speaks of stuff dyed "blue, purple, and scarlet"; "rams'-skins dyed red."

Joseph (1729 B. C.) had a coat of many colors; probably a product of Damascus.

Dyeing is attributed to the Phœnicians. Solomon

(1000 B. C.) sent to Hiram of Tyre for a man "cunning to work in . . . purple and crimson and blue." Ezekiel speaks, in his burden of Tyre, of the "blue and purple from the isles of Elisha," which may mean the Peloponnesus and adjacent islands.

The most celebrated dye of antiquity was the Tyrian purple, derived from a species of murex. Pliny cites two, the *buccinum* and *purpura*. A single drop of fluid was obtained from a sac in the throat of each animal. A quantity was heated with sea-salt, ripened by exposure for three days, diluted with five times its bulk of water, kept warm for six days, being occasionally skimmed; then clarified and applied as a dye to white wool previously prepared by the action of lime-water or fucus. The wool was first plunged into the *purpura* and then into the *buccinum*. Sometimes a preliminary tint was given with coccus (kermes). The dye and dyed goods are celebrated in the Hebrew and other ancient scriptures.

This color seems, from its extreme beauty, permanence, and costliness, to have become regal, and the royal taste is for the same down to our day. The color of the velvet in the crown of the Queen of England is a shade of purple; the velvet coronation robes of George IV. were of that color. Pliny (A. D. 70) says that the robes of triumph in the time of Homer (900 B. C.) were colored. Purple habits were given to Gideon by the Israelites from the spoils of the kings of Midian. Achan secreted a Babylonish garment, and suffered for it. Plutarch says that when Alexander took Susa, the Greeks took from the royal treasury purple stuffs to the value of 5,000 talents (1 talent \$860 × 5,000 = \$4,300,000), which still retained their beauty, though they had lain there 190 years.

Prussian blue was discovered by Diesbach, at Berlin, 1710; aniline, in 1826, by Unverdorben. In 1856, Perkin, experimenting with aniline, treated it with bichromate of potassa, and obtained *mauve*. Arsenic tried as a substitute for bichromate of potassa produced *magenta*; blue, green, violet, and other colors were subsequently produced.

(*Hat-making.*) Hats (black) are dyed in a solution of sulphate of iron, verdigris, and logwood, at a temperature of 180° F. They are alternately dipped and aired, the process being repeated perhaps a dozen times. The hats are all on thin blocks, and a *suit* of five dozen fills a crate, which is swung from a crane, and thus raised and lowered as required.