THE BASIC COLORS: BY PROFESSOR CHARLES E. PELLEW, OF COLUMBIA UNIVERSITY: NUMBER V

SOME of my readers may remember that, in the first paper of this series, it was mentioned that the modern dye-stuffs originated with the discovery, in 1856, by Perkin, of the violet coloring matter known as Mauveïn. This dye was made by the oxidation of the then rather rare chemical, Aniline, and, following this discovery, other chemists, especially in France and Germany, soon obtained from the same chemical, or from substances very closely resembling it, a considerable quantity of powerful and brilliant dye-stuffs of the same general character.

The original Mauveïn was before long superseded, first by Hoffman's Violet, and then by a very important series of violet and purple dyes known as Methyl Violet, with shades ranging from 6 or 7 B for the deep, full purples, to the 6 or 7 R for the very red shades. These violet colors have never been surpassed, or even equaled by any other dyes for brilliancy and richness, although, in common with almost all the other dyes of this class, they are not very fast to sunlight.

Another extremely powerful and brilliant color, used considerably to this day, although discovered nearly fifty years ago, is the dye often called, from its origin, Aniline Red, but named by the German manufacturers Fuchsine, from its rich, full, crimson shades, and, by the French, who discovered and manufactured it soon after the close of Louis Napoleon's Italian campaign, Magenta, after the famous victory of that name.

About this same time some German chemists discovered and introduced a full, rich, brown dye, still largely used for dyeing leather (kid gloves and the like), and, naturally enough, gave it the name of Bismarck Brown. And at approximately the same date was discovered the very valuable blue dye-stuff, perhaps the best of the whole class, with quite a range of full, deep shades and with great fastness to light, called Methylene Blue.

The early colors of this group are the dye-stuffs properly known as the "Aniline Colors" because of their origin, although this name has been applied, loosely, to all of the thousands of artificial dye-stuffs without regard to their source or composition. To the chemist, their chemical structure and their behavior toward reagents, such as acids and alkalies, naturally suggested the name Basic Colors, thereby indicating that they were substances with strong affinity for all sorts of acids, with which they form more or less stable salts, while they can be liberated from these salts by the action of stronger bases, such as ammonia, or the fixed alkalies, soda and potash.

These facts were discovered by Perkin while trying to introduce his Mauveïn into the dyeing industry, and the same chemist discovered the methods, used to this day, for applying these dyes to the different textile materials. He found that the dyes of this class have a strong affinity for the different animal fibers, such as wool, silk, leather, etc., all of which seem to possess some acid properties of their own; but pure vegetable materials, like cotton, linen and paper, from which all impurities such as vegetable acids, gums, etc., have been removed, have no affinity at all for even the most powerful of the Basic Dyes. A cotton handkerchief, boiled for hours in a strong solution of Methyl Violet, can be washed in a few minutes clear of any shade of color, while a piece of silk or wool, soaked for an instant in the same dye bath, will be permanently stained, deep and full.

In order to fasten these colors to the vegetable fiber it is necessary to impart to the latter a distinctly acid character, and this was accomplished by Perkin in a manner still used. He steeped the material for several hours in a hot bath of the

vegetable compound, tannic acid or tannin, found so largely in hemlock and chestnut bark, sumac leaves, nut-galls, and the like; and then loosely fixed the tannin, thus absorbed, by a weak bath of tartar emetic. Cotton or linen fabrics, thus "mordanted," will combine with the Basic Dyes as readily and as firmly as any animal fiber, and the resulting colors, while not necessarily fast to light, are extremely fast to washing.

Since the introduction of the direct cotton dyes, both Salt Dyes and Sulphur Colors, this method of dyeing, for skeins or piece goods, has been very largely discontinued; but, by using a modification of this process, enormous quantities of Basic Colors are still used, on cotton and linen, in the manufacture of calicoes, organdies and other printed fabrics.

Most vegetable materials that are used in a more or less natural condition, like straw, raffia, grass, wood-shavings, jute and the like, contain enough of this natural tannic acid to act as a mordant for the Basic Colors, which are largely used in this connection.

For most of the animal fibers, such as wool, silk, furs, feathers, etc., they have been almost entirely superseded, in commerce, by the class of dye-stuffs known as the Acid Colors, which occur in much greater abundance and variety, and can be applied with much less danger of spoiling the goods by uneven results.

On a small scale it is hardly worth while for the amateur to attempt to use these Basic Colors upon either cotton or linen. The difficulty of correctly and evenly mordanting the goods is quite as great as that of dyeing them afterward. And the Sulphur Colors and Vat Colors will be found quite as fast to washing as the best mordanted Basic Colors, with the additional advantage of being, as a rule, much faster to light, as well as easier of application.

Nor are the shades of these Basic Dyes, as a rule, as attractive as those hitherto discussed. The strong, and brilliant, not to say coarse, shades of Methyl Violet, Malachite Green, Aniline Red and the rest, which created such a sensation when they first appeared in the early sixties, were the particular colors which provoked John Ruskin to unscientific, if not unparliamentary remarks, and which even now are apt to harrow the feelings of the faithful reader of THE CRAFTSMAN.

But these Basic Dyes are not to be scorned in their proper place, even by the most devoted arts and crafts worker. For straw, raffia, chips and other materials used so widely for hats and basket-work these dyes are invaluable; and, judiciously handled, give excellent results. And for the leather-worker they give an easy and simple method of getting effects which it is not always easy to obtain with the acid dyes. They are also useful in dyeing some kinds of artificial silk.

DYEING DIRECTIONS.

Straw, raffia, etc.—The material, well wet in warm water after, if necessary, a good scouring in hot soap suds to remove grease and dirt, is immersed in the dye-liquor containing the dye-stuff dissolved in water acidified with a little acetic acid or vinegar. The dye-bath is slowly heated with the constant turning of the goods, until near boiling; it is then taken off the fire, and the goods lifted out, rinsed in warm water and carefully dried.

These basic colors are not, as a rule, very soluble in water, and generally need the presence of some acid to dissolve them and prevent them from depositing unevenly on the goods. The methylene colors are perhaps the most soluble, as well as the fastest to light of any class.

Many of these Basic Colors, when applied in at all a strong solution, are apt to give a decided metallic luster to the goods. This is occasionally of distinct advantage. When it is not desired, the goods should be brought up to dark shades by carefully dyeing them in successive baths of very dilute dye-liquor.

Leather.—The dyeing of leather on a small scale is rather a special art, and

needs considerable practice to get good results.

First of all great pains must be taken to have the leather thoroughly and evenly moistened. This can be generally accomplished by soaking it for several minutes in a bath of warm water, and then carefully working over the material until the dry spots are all opened out and softened. Sometimes, however, the leather is quite resistent to the water, and it may be necessary to soak it for several hours, over night even, in warm water containing a few drops of ammonia.

If the goods are to be dyed a solid color the dye-liquor may be applied by sponge or pad, or as is more frequently done, the leather may be immersed in a cold or luke warm dye-bath, and then gently heated to 120 degrees or 130 degrees F. The colors are, as before, dissolved in water and a little acetic acid, and the same precautions must be used with regard to a metallic luster.

For dyeing patterns on leather, it is generally best to dissolve the color in water and acetic acid, and apply it to the damp, but not too wet, leather, with a camel-hair brush or a little wad of cotton. The surplus liquor should be wiped off, or taken up with blotting paper, and, as soon as possible, the color rubbed well into the leather.

To get good effects it is necessary to finish the goods carefully. Some workers let the leather dry, and then rub up the leather, on the hair side of course, with the palm of the hand or with the finger, without using any wax or oil. Others finish by rubbing into the smooth side of the leather a little of the white or yellow wax, used as a finishing polish for tan shoes. This can readily be bought at any summer shoe store, or can be prepared by mixing together equal quantities of beeswax and carnauba wax, and thinning it with a little turpentine.

One very successful member of the Arts and Crafts Society, whose leather work has been much admired, uses, as a finish, a mixture of beeswax, turpentine and neats-foot oil. She makes this by first melting the beeswax with a small quantity of turpentine, and then stirring in enough oil to make it soft. This finish is never applied directly, but is always put in a little bag of soft muslin, and rubbed on, and into, the leather with a circular motion.

Selected Dye Stuffs.—Out of the many well known colors of this group, the patents for which have long expired so that they are manufactured and sold at a cheap rate by all of the great dye-houses, comparatively few can be recommended as being fast to light. Methylene Blue, which comes in various dark shades, generally with somewhat of a grayish tone, is thoroughly fast, but is apt, on leather, to dye rather unevenly. The best yellow is Thioflavine T, which is fast and good. Bismarck Brown will be found rather useful in leather dyeing, although it is not particularly fast. The reds are not, as a rule, as fast as the blue and the yellow just mentioned, but the Basic Dyes, known as Safranines and Rhodamines, give beautiful shades, and are perhaps the most permanent reds of the class.

Besides these, the following special colors of the individual dye-houses may be found interesting:

Badische	Rheonine G. F.	Yellow
Cassella	Cyanole F. F.	Blue
	New Phosphine G.	Yellow
	Irisamine G.	Red
	Nigrosine N. Y.	Black
Metz	Rosazeine 5 G.	Red
	Methylene Yellow H.	
	Methylene Heliotrope O.	
	Methylene Violet 3 R. A. Extra	