

Dyeing Fancy Patterns In Textiles

By N. D. WHITE

The Work of the Ancients

Fancy and varicolored patterns in fabrics may be obtained in several different ways: by weaving or knitting in the fabric different colored, or ingrain dyed yarns; by using yarns of different nature and dyeing them in the fabric in the same bath, or in separate baths, according to their affinity for dyestuffs; and, finally, by using yarn ingrain dyed together with undyed yarns and dyeing the latter some contrasting color after the fabric is made up.

The art of producing shot color effects by using threads of various tints was well understood by the ancient Phoenicians. Their multicolored fabrics were introduced in most of the then known countries, and their marvelous textiles were the admiration of the ancients of that time. All their fibres were put on the looms after being dyed, and their dyed yarn was the result of long and laborious efforts.

To the Phoenician of antiquity, considering the painstaking labor and the knowledge he must have possessed to extract his dyeing materials from mollusks, insects, herbs, roots and minerals, and the ability to apply them to the few fibres known in those days, dyeing as it is done to-day would seem child's play, and yet in spite of the seeming simplicity in to-day's dyeing, to the man in charge dyeing is no sinecure.

Dyeing Brought up to Date

While there are dyes for every particular purpose, the number of them is in itself a handicap in choosing the right one for a special purpose. When the dyer had to prepare his own dyes, the number of these was comparatively small. Also, fibres to be dyed were well known and few in number, but since artificial fibres started to invade the textile industry, the dyer's troubles multiplied and it was plainly up to him to either increase his knowledge of the new dyestuffs and new fibres, or fall by the wayside and look for other pursuits.

It was soon learned that what at first seemed to be an impossible situation could be turned to advantage. Some of the new fibres lent themselves to the production of beautiful fabrics of many colors, an era of varicolored effects in textiles started, and while heretofore fabrics of many shades were woven or knitted with dyed yarns it is now left to the ingenuity of the dyer to produce any shade or combination of shades in the raw manufactured fabric from his dye bath.

From the numerous dyes to choose from the main

problem resolves itself in the ability to select and classify the proper ones from the many to be had for a given purpose. The dyestuff makers have been able to put at the disposal of the dyer products for every conceivable use, and the dyer can select for each of his fibers the dye for which it has the most affinity, and which is most adaptable to his work.

Dyeing Two-colored Effects

In making up a fabric with the intention of having it colored in several shades, fibers must be selected that differ in their affinity for dyestuffs. The fibers in general use for textiles are: silk, cotton, linen, wool, and the several rayons. A fabric made up of any two of them may be made to take up two different colors from the same bath, if due precaution and proper dyestuffs are used.

However, to produce a desired effect and when good results are the aim, both the fibers and the dyestuffs must be selected with care, also the use of chemical aides to dyeing must be studied and understood.

Taking the first two fibers mentioned above: silk and cotton. They may be dyed nearly the same shade with some direct colors in the same bath, or they may be dyed two distinct shades by using direct and union colors, but treated in a different way. Thus, Neutral Grey G, Erie Yellow F., and Direct Brown M in suitable proportion, will dye a perfect union of tan on both fibers in a bath of Glauber Salt at the boil. If 1% trisodium phosphate is added to the bath with the salt most of the last two named dyes will go on the cotton, and will be dyed tan leaving the silk with a trace of grey and a two-colored effect will be the result. If a small percentage of acetic acid is now added to the bath, and boiled most of the grey will come down from the cotton and dye the silk to emphasize the two-colored effect.

Prolonged boiling and more acid will remove some of the other dyes from the cotton to be absorbed by the silk almost to a perfect union. And yet the Yellow F and the Brown M are supposed to be cotton dyes to leave silk white, while the grey is a union color to dye silk and cotton alike. Phosphate and the acid may be made to perform wonders when properly understood.

The cotton is usually dyed first and the silk left white or dyed a contrasting color in the same bath with acid and neutral dyeing dyes, or in a separate bath. When requirement for fastness is not rigid, substantive dyes

are most generally used for two-color effects on silk and cotton. Substantive or direct dyes are sold by their makers under various names. Some of them can be diazotized and developed to increase their fastness, others may be chromed or otherwise aftertreated, most are fast enough for ordinary purposes, all must be tested to leave silk white. Here are some of the names by which they may be had: Amanil, Amidine, Benzo, Diamine, Dianil, Diazine, Diazo, Direct, Erie, Garfanil, Niagara, Pontamine, Solantine, Tetramine, Trianol, and others.

From such an array of Direct dyes, the dyer must select for himself those that will be proven by actual experiment to leave silk white, then he can help protect his silk from getting tinted by using soda ash, phosphate or soap in the dyeing bath. The goods properly degummed and washed are entered in a bath containing one to two per cent of Turkey Red oil and some penetrant, and worked for about ten minutes at 110 to 120° F. then the dyestuffs well dissolved are sifted into the dye vat, and the bath slowly raised to the boil. After twenty minutes, two per cent of soda ash or trisodium phosphate is added and the proper amount of Glauber Salt calculated on the quantity of dyestuff used and boiling continued for twenty minutes longer. After this the silk may be dyed any shade desired by adding acid or neutral dyes in the same bath, or in a separate bath.

For a pattern of *Cotton Blue and Silk Green*:

3% Direct Blue 3B

1% Acid Green B

dye as above, add more Green for a darker shade on the silk.

Cotton Blue, Silk Orange:

3% Direct Blue 3B

1% Metanil Yellow

dye as above, tone in a fresh bath to the Orange shade desired with Wool Orange.

If a Red is wanted on the silk instead of Orange, use Fast Red S conc., Brilliant Milling Red, or any acid or neutral Red.

Cotton Red, Silk Blue:

3% Fast Scarlet 4 B S—or more for
a darker shade

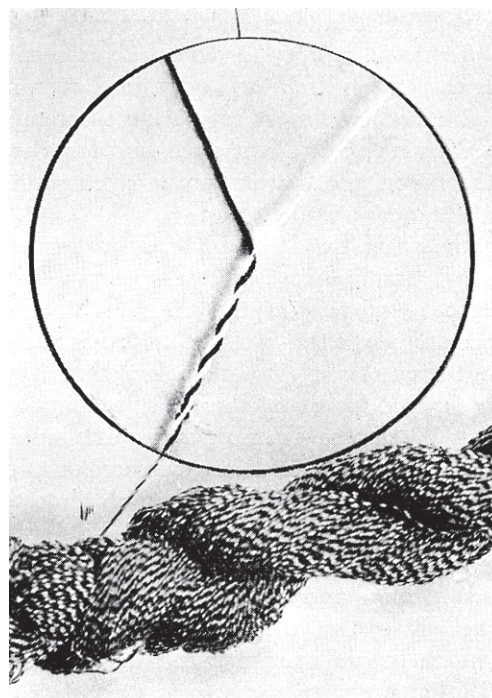
½% Alphazurine A

Sulphur Dyes in Two-colored Effects

When fastness in the dyed fabric is required, a limited number of sulphur colors may be chosen from the following trade-named sulphur dyes: Amalthon, Indophenol, Katigene, Pyrogene, Sulfogene, Sulphur. In this case the silk must be protected from the destructive action of the sodium sulphide used in dissolving the sulphur dyes by adding to the bath glue, glucose, pro-

tectol, or any of the chemicals recommended by the dye manufacturer for that purpose.

The bath is prepared with the amount of sodium sulphide required for the sulphur dye selected, the proper amount of Glauber Salt and the buffer to protect the silk. The cotton is dyed for one hour or long enough to obtain the shade wanted, then removed from this bath and left in the air to oxidize for twenty minutes or half an hour. The cotton will be dyed, and the silk left white or nearly so, and ready to be given the shade desired. The goods are now washed, and the silk dyed with the same dyestuffs mentioned for use with the direct colors.



A Skein of a Two-Colors Two-Fibers Thread, Cotton Dyed Sulphur Black and Rayon White. Magnification Shows Construction of Thread

Some dyes useful for this purpose may be mentioned here as representatives of this series of acid and neutral dyes:

Fast Red A and S conc.
Rhodamine (all brands)
Brilliant Milling Red
Metanil Yellow
Fast Silk Yellow G
Quinoline Yellow
Azo Yellow (all brands)
Wool Orange
Acid Green (all brands)
Alphazurine A and L
Patent Blue

Novazol Blue
Acid Violets (all brands)

The above described methods of dyeing can be used on most fabrics woven or knitted with silk and mercerized cotton.

Dyeing Many-Colored Fabrics

For fabric containing rayon besides silk and cotton, the procedure in dyeing is much the same except that the rayon must be chosen for the specific purpose it must serve. If it is to be put into the mixture to enhance the luster of the fabric, and has to be dyed a solid shade with silk and cotton viscose, or cuprammonium, rayon is by far the best to be used.

By virtue of their chemical composition these two rayons possess an affinity for cotton dyes even greater than for the cotton itself, and very good even matches can be obtained by simply regulating the temperature of the bath with most direct dyes, and for a two-color effect the rayon and cotton can be dyed some shade, and the silk a contrasting color.

If on the other hand the rayon is to be used for a three-color combination cellulose,—acetate will serve the purpose admirably as this chemical fiber will not dye successfully with any of the ordinary run of dyestuffs but must be dyed with colors that have been specially devised for that fiber. A combination of silk, cotton, and celanese is therefore quite suitable for fabric that has to be dyed in a three color effect. In this case the dyer must assure himself that the dyes selected are suitable for this work. The dyes for the celanese, if properly applied, are sure to perform well, but the silk colors and the direct dyes must be chosen with care and tested to leave the Celanese clear. It should be the business of dyestuff dealers to furnish dyestuffs that are sure to perform as required, but it is always advisable for the dyer to test his dyes to avoid trouble and worries, and the time spent in the laboratory testing dyes is his best insurance against failure and disaster.

When more than three colors are desired in a fabric, one or more is put in it dyed a fast and sometime resisted dye. The last three fibers mentioned may be supplemented by one or two more. Wool may be added to furnish the source of another color, and theoretically four or even five colors can be obtained. It has been done in the laboratory, but practically and on a large scale in the dye house, it would be hazardous to attempt it. The work involved and the risk is, in the opinion of the writer, such as to discourage it. Cotton can be dyed with sulphur colors, and viscose or tubize with vat dyes to stand cross-dyeing effectively in combination, and the other fibers dyed in the piece without injury to the yarn-dyed fiber.

Multicolored Effect on Hosiery

In some of the half hose showing a multitude of colors, a thread of rayon vat or cotton sulphur dyed yarn is twisted with a white (see illustration) thread of the same material, or a fiber of a different nature, then knitted in the hose to produce a pepper and salt effect. Then if silk, celanese, wool, any or all of them, are put into the hose to make a figured pattern, the most striking effect can be produced to satisfy any whim and the dyer can give vent to his imagination and create combinations of color most attractive or otherwise.

The danger of dyeing combinations of silk, cotton, and acetate lies in the fact that the acetate may lose its luster and be saponified in a too hot and prolonged degumming soap bath necessary to boil off the silk. Saponification of the acetate starts in a soap bath with a temperature above 175° F. In that state, the acetate is liable to be badly stained by the dyestuffs used for the silk and cotton in the fabric and results be anything but satisfactory. If the silk could be put into the fabric already degummed, the work would be greatly simplified, but as that is not always the wish of the manufacturer extreme care must be taken by the dyer, and the processing watched very closely.

A degumming bath of olive oil soap at 175° F. is quite effective if enough soap is used at the start. Twenty-five per cent based on the amount of cocoon silk in the combination is sufficient and with the silk spread out through the fabric, as it is in such combinations of fibers, from twenty-five to thirty-five minutes at that temperature is quite enough for satisfactory results. Dyestuffs for the acetate and direct colors for the cotton can be added in the degumming bath, and by the time the silk is boiled off these two fibers are dyed and the silk can then be shaded in the finishing bath using acid dyes with the aid of some acetic acid.

Acetate in Three-color Dyeing

Assuming that the weight of the silk is one-third of the total weight of one hundred pounds of goods, eight pounds of olive soap is dissolved in a tub and put in the boil-off bath to which has been added four per cent of good grade sulphonated castor oil, or Turkey Red oil. The direct dyes needed for the shade the cotton has to be dyed may be added, and the acetate dyes selected for this fiber and properly dissolved in one pound of soap also entered. (Most dyes for this fiber are dissolved in soap).

In some cases the dyes for the silk may also be added in this bath, but for clear cut cross-dyeing effect it is best to leave the silk white and finish dyeing afterwards. The goods are now entered, and the bath raised to 140° F. and run at this temperature for twenty

minutes or half an hour, and from ten to thirty pounds of Glauber salt are entered. With properly selected direct colors the cotton dyes best at this temperature. The bath is now raised to 175° F. and run another half hour to complete the degumming of the silk. A swatch, or a stocking, is now taken, washed and dried to match the colors obtained. If no addition of dyestuff for either the cotton or the rayon is needed, the goods are washed and the silk part brought up to the shade of the pattern in the finishing bath.

Dyestuffs for dyeing of the acetate type rayon may be selected from the following series, according to requirements for fastness and line of work: Acetyl, Celanol, S. R. A., Tetracele, and Trianol Celco.

The Result of the Beaker Transferred to the Dye House

In conclusion, it may be stated that while most difficulties in dyeing have been overcome by the dyestuff

makers who with commendable perseverance have been able to bring to the dyer dyes for every conceivable purpose, no dyeing formula is as yet so fool-proof as some would like to have them. Every phase in processing has to be watched closely if good results are to be obtained.

Dyeing many shades in a fabric is not such a hazardous operation as it seems, but no careless or slipshod, and rule of thumb methods should be tolerated if good results are to be secured. Dyeing instruction as furnished with each dye or series of dyestuffs should be followed scrupulously to the letter, and attention to the slightest detail in processing is essential; for in the final analysis the largest percentage of success in dyeing to-day is due to the observation and data obtained in the laboratory, and the work done in the beaker transferred to the dye house.
