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W. A. CONNER, Director

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ADULT CLOTHING DEMONSTRATION

Second Year Demonstration No. 3

Textiles

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TEXTILES

The value of a textile fabric depends upon its wearing quality, beauty and suitability to purpose. To be able to choose material wisely, women should have some knowledge of the fibers, their characteristics and properties; of the weaves, dyes, adulteration and finish of fabrics; and of tests to be used in determining the content and quality of fabrics.

Fibers

The important fibers used for textile purposes are cotton, linen, silk, artificial silk, and wool. Other fibers are jute, hemp, pineapple, coir and kapok. To be used satisfactorily for textile purposes a fiber must possess certain properties. It must have strength, elasticity, pliablity, fineness, and surface texture necessary for spinning into a fine, even, strong yarn suitable for weaving. It must be susceptible to the action of water, heat, chemicals, friction and other forces in bleaching, dyeing and cleaning. To be of economic value, it must be easily and cheaply produced in large quantities. Cotton, linen, silk, and wool possess these qualities to a greater extent than the other fibers mentioned and for that reason form the main sources of our great variety of textile materials.

Cotton.—The cotton plant produces the cheapest and most commonly used fiber. The fiber is a long single cell, cylindrical in shape with a canal running through the center. When the fiber ripens it takes on a natural spiral twist due to the contraction and thickening of the cell walls. The natural twist in the fiber makes it possible to spin very fine, strong yarn of cotton in spite of its shortness.

The value of the cotton fiber depends on its twist, length, strength, fineness, color and lustre.

Mercerized Cotton.—Mercerization is a process by which the value, strength, and lustre of cotton are greatly increased. The chemical and physical nature of the fiber is changed by placing the yarn or cloth in a cold concentrated solution of caustic alkali, under tension to prevent shrinking. The fiber absorbs the alkali, swells and loses most of its twist. Under the microscope it appears as a long cylindrical tube with only an occasional twist. Tensile strength, lustre and affinity for dyestuffs are all increased. Mercerized cotton is used as a substitute for both linen and silk. The permanent lustre of mercerized cotton is often imitated by calendering or pressing.

Linen.—The flax plant produces our longest, strongest and most beautiful vegetable fiber. The characteristic marking of the flax fiber is the node

or cross section marking which appears rather frequently and may be seen with the aid of the microscope.

The quality and color of the fiber depends largely upon the retting process which is necessary to remove the fiber from the woody tissue of the flax stalk. When over-retted the fiber is weak and brittle and will not spin well. The fiber has a very high luster and is much stronger than cotton. Due to the length of the fiber, the yarn is without the fuzz and lint so objectionable in cotton. Linen fibers do not take dyes as readily as cotton and likewise do not hold dyes and stains. This quality makes it desirable for table linen and undesirable for colored garments. Linen is destroyed by mineral acids but is more slowly disintegrated by the action of hydrochloric acid than is cotton. The linen fiber is slightly affected by alkali and should be laundered carefully.

Silk.—The silk fiber consists of a continuous double filament spun by the silk worm. The double filament is held together by sericin, a gummy substance, which is boiled off leaving the filaments separate, lustrous and transparent.

Silk has a great affinity for dyestuffs and solutions of metallic salts, such as the salts of tin, iron and chromium. These salts can be absorbed by the silk fiber until the weight has been increased about four hundred per cent. The weighting of silk is the most common form of adulteration.

Wool.—The wool fiber is the fine curly covering of the sheep. It is soft, elastic and varies in length from one inch to eight inches. When examined under the microscope, it may be distinguished from other fibers by the serrations or scales which overlap resembling the scales on fish. These scales expand and open when warm and moist. Then as they cool and dry, they contract and close up. If friction or pressure is exerted while the scales are expanded the fibers interlock and this causes wool to shrink. This is what often happens to wool underwear, baby clothes, etc., when they are washed. The scaly structure of the fiber also makes felting possible.

The wool fiber is a poor conductor of heat, therefore, is very desirable for clothing for winter. The softness and elasticity prevent wrinkles and mussiness and make the fabric satisfactory for serviceable wear. It has a greater affinity for dye than any other fiber. The amount of luster depends on the scales. The fiber which has less prominent scales has more luster.

Wool fiber is made into both woolen and worsted yarn, the chief difference in the two kinds of yarn being in the arrangement of the fibers. The fibers in the worsted yarn are arranged parallel while those of the woolen yarn run in all directions, more or less tangled. The arrangement of the fibers in the woolen yarn makes shrinking and felting possible.

Shoddy and Wool Substitutes.—Reworked wool, called shoddy, extracts, regenerated wool, or remanufactured wool is often added to virgin wool. Virgin wool is wool fiber that has never been manufactured into any kind of fabric. There is not sufficient virgin or new wool to supply the demands and there should be no objection to the use of reworked wool. Fabrics con-

taining reworked wool should not be sold at the same price as those made from virgin wool.

The term shoddy is often applied to all reworked fibers. This is misleading as there are different qualities of reworked fibers, the quality depending largely upon the source of production. The following classification is based upon the origin and nature of the fibers.

1. Shoddy, made from all-wool rags or waste which has not been felted and from knitted fabrics. The fiber is a good grade and about one inch in length, and is usually mixed with virgin wool and manufactured into high grade fabrics.

2. Mungo is made from woolen fabrics which have been felted. In tearing up the felted fabrics the fibers are torn. Mungo is a short fiber and is of less value than shoddy.

3. Extract wool is obtained from mixed wool and cotton materials by the process of carbonization which destroys the vegetable fiber.

4. Flocks are the short clippings from the napping machines.

5. Noils are the short fibers that are separated from the tops or long staple fibers in the combing process. They are carded and spun into woolen yarns.

Artificial Silk.—Artificial silk is made by a chemical process from gelatin, wood pulp, or short cotton fibers. Because of the high cost and beauty of silk, many attempts have been made to produce fibers that resemble those produced by the silk worm, but with the exception of high luster and affinity for dyestuffs, artificial silk does not yet rival the natural product in its properties. In general, the process of making artificial silk consists of forcing a solution of cellulose or gelatin through capillary tubes to form a continuous fiber for spinning. It is then treated in such a way as to harden it and make it insoluble in water. Under the microscope it resembles a straight glass rod.

At first, artificial silk was used only for neckties, braids, embroidery thread, trimmings and novelties that did not require washing. At present it is used extensively, in combination with cotton and silk, for dress materials, novelty silks, ribbons and fabrics for household use. In knit goods it is manufactured into sweaters, underwear, hosiery and dress goods.

Artificial silks do not now withstand the action of soap and water as well as the true silk fibers. The fibers swell and lose their strength when wet. However, recent improvements in the manufacture have made artificial silk more satisfactory for garments to be washed. Artificial silk does not turn yellow when exposed to the action on sunlight and moisture as true silk does. It has a higher luster than true silk; the luster is metallic in appearance and not so soft and beautiful as true silk. The fiber is harsh, inelastic and coarser than true silk but well suited to some sport fabrics. It takes and holds dye well.

YARN

The continuous strand of spun fibers used for weaving, knitting, or making thread is called yarn. The yarn in a fabric determines largely its

durability, serviceability, texture and comfort. The important steps in the production of yarn are carding, combing and spinning. Carding pulls the fibers apart, straightens them and leaves them in a soft, untwisted roll called a sliver. Combing is a process employed only when fine yarn is to be made. It continues the straightening of the fibers and separates the short ones from the long. Spinning consists of drawing out of the carded or combed sliver and putting in the twist to form yarn of the desired thickness and strength.

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FABRICS

The cost, appearance, and wearing quality of a fabric are affected by its construction, coloring, finishing and possibly adulteration.

Construction.—The important methods of producing fabrics are weaving, knitting, felting and netting.

Weaving is the interlacing of two sets of yarns at right angles. The set of yarn running the length of the cloth, parallel to the selvage, is called the warp. The set of yarns that go across the material is called the woof, filling, or weft.

In studying fabrics the important things to notice about the weave is its closeness or looseness and the way in which the yarns are interlaced. The firmness of a fabric depends to a great extent on the closeness of the weave. The closely woven fabric usually holds its shape better and gives longer service. An open weave makes a sheer, cool, dainty fabric, but it is also used in making cheap cloth, because it takes less yarn and less labor.

An examination of such fabrics as domestic, serge, satin, damask and brocade will give one an idea of the various ways yarns are interlaced to produce different textures and designs. The principal weaves are plain or tabby as in domestic and nainsook; twill as in serge and tricotine; and satin as in satin and sateen. Many effects are produced by variations of these three fundamental weaves.

Finishing.—Since the finishing processes affect the appearance and durability of cloth, they are an important consideration in the selection of fabrics. The finishing processes for the four principal fibers are different and may be considered separately.

Cotton.—Bleaching is the first process of finishing white or light colored cotton material. The original yellow or gray coloring matter is destroyed by subjecting the material to dilute chemical baths until it becomes white.

Gassing or Singeing.—Since the cotton fiber is very short, there are many ends brought to the surface of the cloth. These give the cloth a fuzzy appearance, and to make the surface smoother the best grades of cotton fabric are passed quickly over gas flames that singe the loose ends.

Sizing.—The appearance and firmness of many cotton fabrics are affected by the use of various substances including clay, starch, mucilage, glycerine, wax and ammonia water.

The soft supple finish of nainsook, batiste, and some grades of gingham is given by glycerin, fats or oils and waxes; the gloss of percalines, dress

linings and cambric by mucilage, gums and ammonia water. Calendering increases the luster of such fabrics. This process consists of passing the cloth between heavy, heated cylinders. The fibers are flattened and a glaze is given the cloth. Calendering is used to imitate mercerization; the glaze may be removed in laundering. A firm full finish is given to many fabrics by the addition of starch and by much pressing. The stiffness in swisses and lawns is produced by mucilage and gum. The solid appearance of cretonnes and canvas is due to clay.

The lisle finish is given to cotton yarns to be used for hosiery and underwear. The yarns are passed rapidly over gas flames which singe off projecting ends, leaving a smooth glossy yarn.

Linen.—One of the most important processes in finishing linen is bleaching. This removes the natural gray or brown coloring matter of the fiber and any stains that may have accumulated in spinning and weaving. Linen comes in four different bleaches—full-bleached, three-quarters, half, and quarter-bleached. The strength of the cloth is determined largely by the amount and kind of bleaching. If the cloth is bleached by stretching it on the grass in the sun, the strength is not impaired, but this process requires a long time and is expensive. In most factories bleaching is done at least partially by chemicals. The best Irish linen is bleached out-of-doors and for that reason is supposed to be stronger and more beautiful than other linens.

The best grades of linen do not owe their beauty and luster to finishing processes. The beetling process is used on most linens to increase their luster and thick leathery feel. It consists of pounding the cloth with wooden mallets or heavy blocks; this flattens and closes up the yarns so as to increase the luster and apparent firmness. After beetling the cloth is pressed.

The cheaper grades of linen are sized with starch, clay and wax to increase firmness and weight.

Wool.—Fabrics made of wool fibers are divided into two main classes, woolen and worsted. The chief difference between the two is that woolens are made from yarns in which the fibers are crossed and intermingled, while worsteds are made from yarns that have been combed so that the fibers are straight and parallel. The beauty of the worsted depends upon the regularity of the yarns and weave, while that of the woolen depends upon the finish given the cloth after it has been woven.

Fulling is a process of felting the fibers together and causing the cloth to increase in firmness and compactness. Woolens and worsteds are both fulled, but because of the difference in the nature of the fibers and yarns the effects are quite different. The combed, hard-twisted yarn used in worsted gives a smooth and wiry material that becomes softer, firmer and more pliable when slightly felted. The carded, soft-twisted yarns and the loose weave of woolen fabrics make a large amount of felting possible—usually one-half of their original width. For fulling the selvages are sewed together with the right side inside. The cloth is soaked in hot, soapy water and then run between heavy rollers which cause it to shrink in width. It is folded and allowed to stand until it shrinks in length.

Short wool fibers called flocks are added to cheap woolen fabrics in the felting process. If they are felted in so that they will not pull out, they increase the wearing quality of the cloth and make it heavier and warmer. This is one method of adulteration, since flocks are usually added to cover up the face of the cloth, to add weight and give a napped surface. In cheap woolens the flocks fall out and leave a rough unfinished surface.

Napping is the process of raising the nap or fuz on the surface of a fabric. This is done by brushing the cloth with teasles or small wire brushes. After the nap has been brushed up, it is sheared off to the length desired. The napping, brushing and pressing all tend to bring out the luster of the wool.

Silk.—The silk fiber contains from twenty-five to thirty per cent natural gum. This gum makes the fiber harsh, wiry, coarse and dull and prevents weaving into soft, lustrous fabrics that will take dye. The softening and removing of this gum is called degumming. Ecru silk is only partially degummed and is not so lustrous as other silks. Manufacturers make up for the loss of the weight when the gum is removed by a process called weighting. Silk has a great affinity for dyestuffs and can absorb a large amount of salts of tin, lead and iron in solution with the dye bath. Twenty-five percent of weighting is considered a legitimate amount, but as much as four hundred per cent can be added. Heavily weighted materials are stiff, heavy and impractical for wear. Taffeta is often heavily weighted and this causes it to split. "Pure-dye" silk has only twenty-five per cent of weighting. Silk may be tested for weighting by burning. The mineral salts which destroy the silk fiber by their weight and the cutting edges of their crystals will not burn in a flame. Pure silk curls up to a black gummy silk ball on burning. Heavily weighted silk will retain the shape of the fabric when burned. The amount of weighting is indicated by the amount of residue.

Rules for Judging Cloth

The following "Rules for Judging Cloth" have been taken from "Textile Fabrics," by Elizabeth Dyer, and may be found helpful in determining the quality and value with reference to the use of the fabric:

"Rules for judging cloth.

"1. **Look at the surface of the cloth.**

"a. Notice the construction.

"What kind of weave has it? Is the construction regular and even, close and firm, or is it loose and open? If open, has it been woven so for the purpose of producing a thin, sheer fabric, or a cheap one? Is it cloudy: i.e., is the yarn, which should be uniform, thick in some places and thin in others?

"b. The color.

"Is the color even and clear? Is it thoroughly dyed? (Ravel a thread.)

c. The finish.

"What kind of finish has it? Will it soon wear off or become shabby?

2. **Hold to the light.**

"Do you detect irregularities, thin places, sizing?

"3. **Feel.**

"Has it the characteristic feel of wool? Linen? Silk? Cotton? Does it feel firm, or sleazy? Has it the thickness that you desire?

"4. **Rub between your hands.**

"Notice the surface of cloth before and after rubbing, for sizing, firmness of construction, and permanence of finish.

"5. **Test for strength.**

"If you are especially anxious to get a strong, durable cloth that will not tear or wear out quickly, test its strength by holding the cloth with both hands and pressing downward with your thumbs close together. In some cloths, if the construction is weak, the threads will separate. This is especially important in buying cloth which will get considerable strain, as for underwear, linings or for children's garments.

"6. **Tests for color fastness.**

"If the cloth can be tested, following methods may be used:

"If testing for fastness of color to light and weather, take a sample of cloth and cover half of it, allowing the other half to remain in the sun and air for a week or more, then compare the two halves.

"If the test is for fastness to washing, wash a sample, making sure that the soap, temperature of water, and amount of rubbing and wringing are the same as the cloth will be subjected to when made up. Sometimes a person will test for fastness of color by putting the sample in cold water and drying it on the radiator or somewhere in the house. But when that cloth is made up, it is washed with laundry soap in hot water, goes through a series of rinses, and is then taken out-of-doors to dry in the shade or sun; naturally, the color will not react in the same way as it did in the sample that was simply put into cold water."

Tests for Content of Fabrics

Burning Yarns.—The burning test may be used to determine whether animal or vegetable fibers have been used in producing a fabric. Mixtures of wool and cotton and silk and cotton are very common, and these fabrics are too often bought for wool and silk. Brilliantine, mohair, palm beach cloth and inexpensive serge have cotton warp and wool woof. Many flannels particularly the non-shrinking ones have fifty per cent cotton mixed with the wool before spinning. The cotton crepe de chine and many inexpensive silks, as A. B. C., Seco and Aledo, are woven of cotton warp and spun silk woof.

To test for animal or vegetable fibers, ravel the cloth and burn each set of yarns. Cotton and linen burn with a flash, like paper, leaving no residue. Wool and silk burn more slowly, forming a bead at the end and giving off an odor like burning hair or feathers. The odor is due to the nitrogen in their composition. The odor of burning wool is stronger than that of burning silk due to the presence of sulphur in wool.

Artificial or fiber silk may be combined with cotton, true silk or wool. Such combinations may be identified by burning the yarns separately. Artificial silk burns like cotton but flames up more quickly and does not leave a residue.

Silk may be tested for weighting by burning. Unweighted silk burns like wool, forming a bead or ball at the end, while weighted silk retains the shape of the fabric. When silk splits lengthwise, it is because it was yarn-dyed and the woof yarns only were weighted. In testing a sample it is well to ravel the sample and burn the warp and woof yarns separately to detect weighting with mineral salts.

Chemical Test.—If cotton and wool have been mixed before spinning into yarn, the burning test will not be a means of detecting the presence of cotton. Such material may be tested by boiling for fifteen minutes in a lye solution (one tablespoon of lye to one cup of water). The wool will be completely dissolved and the cotton left. In Shepherd's checks and many fancy fabrics cotton and wool are combined in various ways, and this test will reveal the amount and arrangement of the fibers.