

# CHAPTER 1

## OUR WEAVING HERITAGE

A MARKED REVIVAL IN THE ARTS AND CRAFTS has occurred since the 1920's. Handweaving has shared in this movement to such an extent that today we find weavers in many parts of the world who are producing fabrics of aesthetic quality. A few work professionally with architects, decorators, and designers, but most weavers follow the craft for their own pleasure as an avocation.

Whatever our accomplishments today, they are but a very small link in the long evolution of handweaving—a craft that dates back to the beginnings of Man.

### ► DEVELOPMENT OF FUNDAMENTAL WEAVES

The fundamental aspects of handweaving have remained unchanged. Our looms are essentially the same as those used a thousand years ago, and many of our fabrics are woven in structures that antedate that period. The fundamental weaves—plain, twill, and satin—were developed before the Christian era.

Just how early Man became a weaver is a matter of speculation. Originally, he used pelts and hides for garments and blankets. The concept of a web—a woven structure—was probably intuitive and could be ascribed to chance. Since food has always been a primary concern in all ages, it is not unlikely that primitive Man first realized the possibilities of the web from interlacing twigs and grasses, in making weirs and nets that would assist in catching fish and game. By twining, knotting, and braiding, Man created such utilities as mats and baskets many years before making cloth.

The earliest cloth fragments found by archeologists have been estimated by some authorities as being more than ten thousand years old. Such fragments, made of linen, have been found in Switzerland, in the area inhabited by the Neolithic Lake Dwellers.

The making of cloth was contingent upon two factors: finding suitable fibers, and devising a process that would twist these fibers into a strand. The blue-flowering flax plant, native to Europe and Africa, grew abundantly, and the stem of this yielded thin, tough fibers, flexible, and of sufficient length to permit them to be twisted into yarn.

The tool that was originally made for this operation was the *spindle*. It consisted of a narrow piece of wood, 6 to 15 inches in length, smooth and tapered on both ends. Between the center and one end was attached a disc made of clay, wood, or bone called a *whorl* and as the operator rotated the spindle between his fingers the disc would impart momentum, as in a child's top.

Loosely twisted fibers were first attached to a notch at the top of the spindle; it was then rotated and, by twisting, the fibers were drawn out into a strand. Repetition of this performance would reduce the size of the strand and form it into a compact yarn. In spinning very fine yarns, the spindle might rest in a bowl of water. By frequently dipping the fingers in the water, the moisture promoted adhesion when the fibers were being twisted. Such methods have been delineated on many ancient pottery vessels.

It was by this method the yarns for the famous Dacca muslins of India were spun, more than two thousand years ago. These cotton fabrics were like cobwebs—transparently thin and made from incredibly small yarns. Using a spindle the size of a darning needle, fibers were drawn out into minute strands that often yielded two hundred miles of yarn to the pound. So adept were the weavers of that period that they used these yarns as warp elements as well as for filler.

#### ► KINDS OF LOOMS

The first requisite to weaving is to keep warp yarns under tension—so they will lie, in order, on one plane.

The first looms were vertical. Weavers suspended the warp from a horizontal pole or bar and, at the bottom, they used a weight for tension. The means for holding down the warp varied, and it is significant

that different peoples in widely separated parts of the world used the same method, depending on the fiber that was used in the warp.

Such scattered peoples as the Swiss Lake Dwellers, the early Egyptians, the Scandinavians, and the Haida Indians of Alaska, all wove chiefly with linen and, to achieve their warp tension, they tied stones or weights to individual warp yarns.

In India, Central America, and Peru—where cotton was used more often than other fibers—a pair of poles or bars was used. Early Chinese are said to have used this method for silk which, like cotton, adjusts itself more readily in warp than does linen.

An adaptation of these vertical looms was devised by the pre-Inca Peruvians. They developed a method that enabled the weaver to regu-

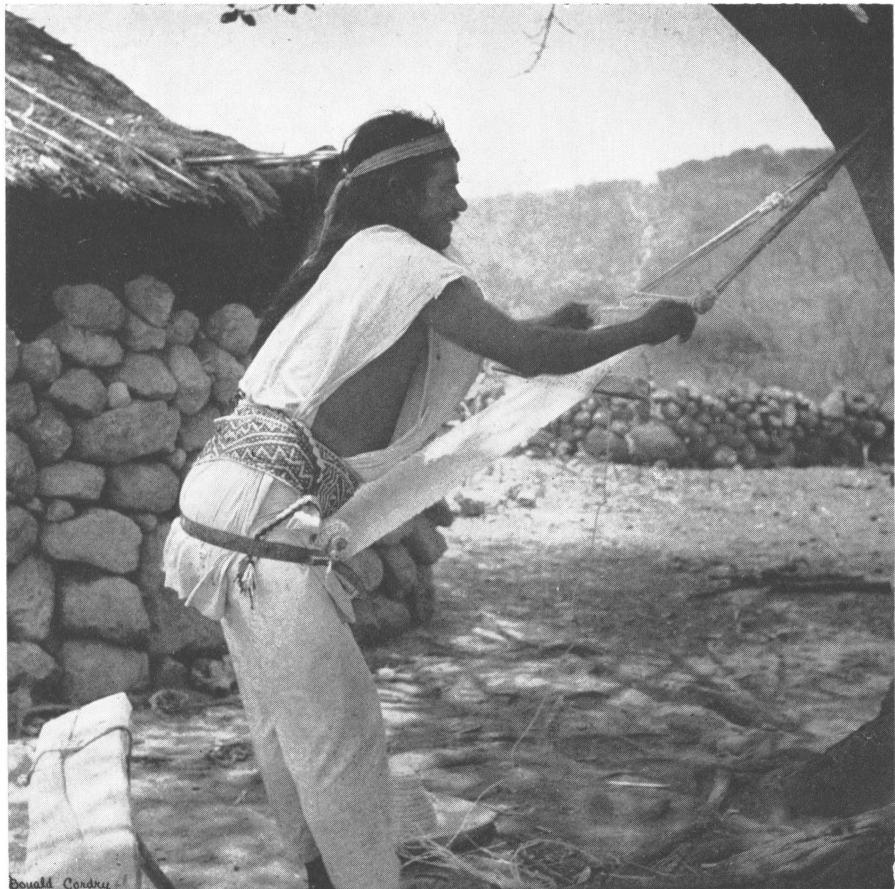


Fig. 1.1—A Huichol Indian of El Cuapinole, Nayarit, Mexico, the side view showing tension placed upon the backstrap. (Photograph by Donald Cordry, owned by the Cooper Union Museum. Courtesy "Handweaver and Craftsman.")



Fig. 1.2—Backstrap loom being used by a Zapotecan woman of Yalalag, Oaxaca, Mexico. (Photograph by Donald Cordry, owned by the Cooper Union Museum. Courtesy "Handweaver and Craftsman.") Tension is maintained by the stance and pull of the body against the loom frame. Length of warp can be increased by wrapping around the upper loom bar, while width is limited by the reach of the arms.

late and maintain warp tension at will. Two bars were used, and at the end of each bar a heavy cord was lashed to form a loop. One loop went about a tree, the other about the waist of the weaver. By leaning back against the loop, or waist strap, the weaver pulled up the warp; a shift of weight, forward or back, adjusted the tension as he liked. This type of loom is used today by natives in Central America; it is seen occasionally in Mexico and among the Indians in southwestern United States.



For centuries the act of weaving was accomplished solely with the fingers, by lifting each warp yarn separately. In order to lift a group of warp yarns at one time, thereby forming what we call the *shed*, some sort of heddle and rod arrangement had to be developed. An example of an early version is shown in Figure 1.3. The reader will appreciate the obvious disadvantage of this heddle rod: one hand constantly must be em-

Fig. 1.3—Diagram of a primitive backstrap loom: (a) loom bars; (b) shed rod; (c) heddle rod; (d) batten or sword; (e) bobbin; (f) backstrap; (g) warp lashing; (h) heading string; (i) lease cord; (j) lease cord; (k) warp; (l) weft. (From "Andean Culture History," by W. C. Bennett and J. B. Bird. Courtesy of the American Museum of Natural History.) Warp is attached to the warp bars. When heddle rod (c) is pulled forward, a shed is formed for the weft. This is beaten into position by the batten or sword, then the alternate warp yarns are lifted to form a shed. The bobbin is returned and the batten again beats the weft into place. The warp is held taut by fastening the cord attached to the upper loom bar to some stationary object while the backstrap goes around the weaver's waist or hips. This loom was known in Egypt prior to 2000 B.C. According to Junius Bird it apparently was not known to Peruvian weavers before 1200 B.C. It is used at the present time in Mexico, Central America, and South America.

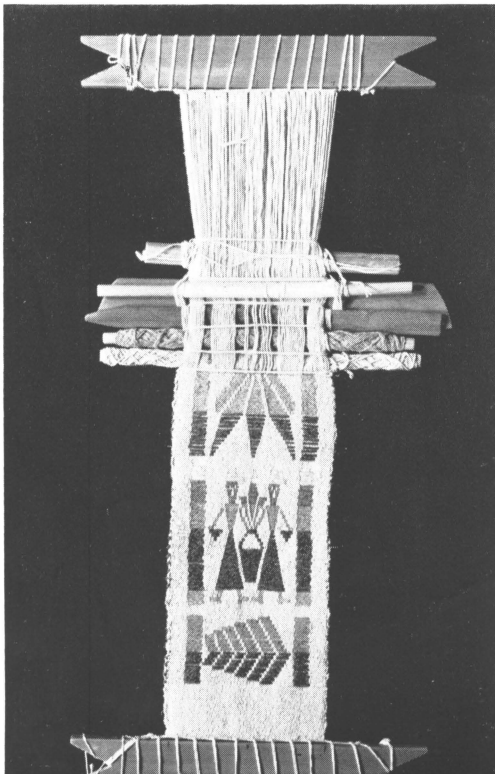
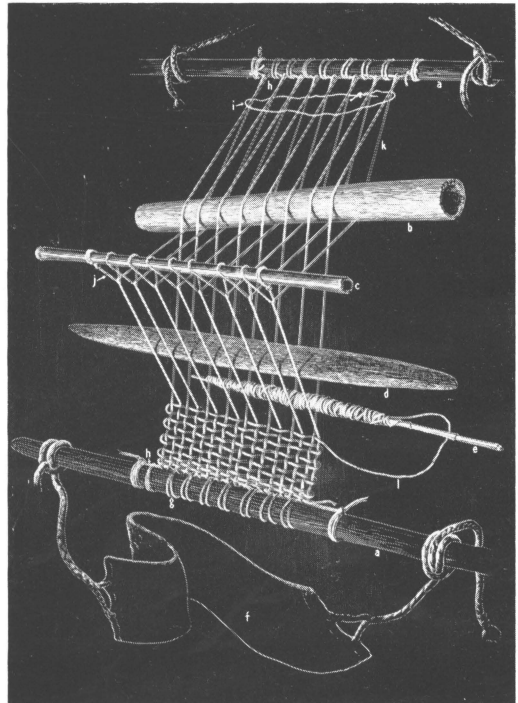
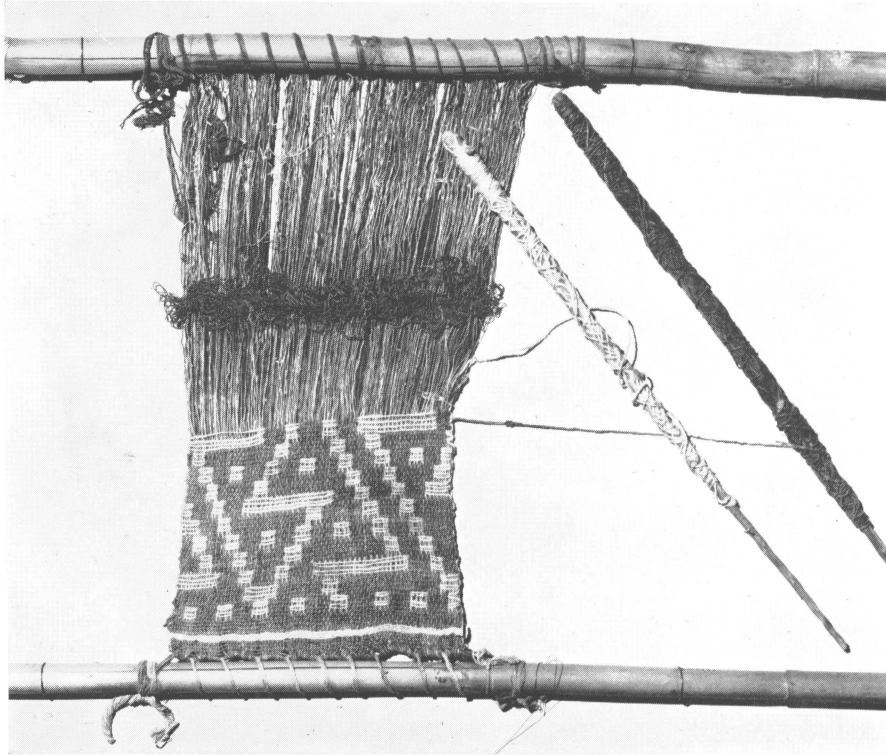


Fig. 1.4—Loom from Lima, Peru, referred to as the rod-and-heald type, a modern loom similar in operation to the backstrap loom. (From the Florence Dibell Bartlett Collection. Courtesy of the Art Institute of Chicago.)

ployed to hold the rod up and away from the remaining warp yarns in order to pass the filler yarn.

To free both hands, so the weaver could use a shuttle, required the discovery and application of two important mechanical devices—the

Fig. 1.5—Peruvian loom with double cloth in process of weaving. (American Museum of Natural History. Courtesy "Handweaver and Craftsman.") Note fineness and closeness of warp and pattern.



pulley and the lever. A loom that incorporated these, with a horizontal warp, first appeared in early Egyptian excavations. Some authorities, however, believe the Chinese used a similar loom as early as 1298 B.C.

It was thirteen hundred years later that China developed the draw loom—a notable development. In this loom the individual warp yarns were attached to cords, which were passed through holes in a board called the *comber board*; the cords then were grouped according to the pattern to be woven. Control cords were lifted by a boy stationed at the top of the loom. With a draw-boy, the weaver was free to concentrate his attention on the shuttle.

The draw loom did two things: it increased textile production tre-

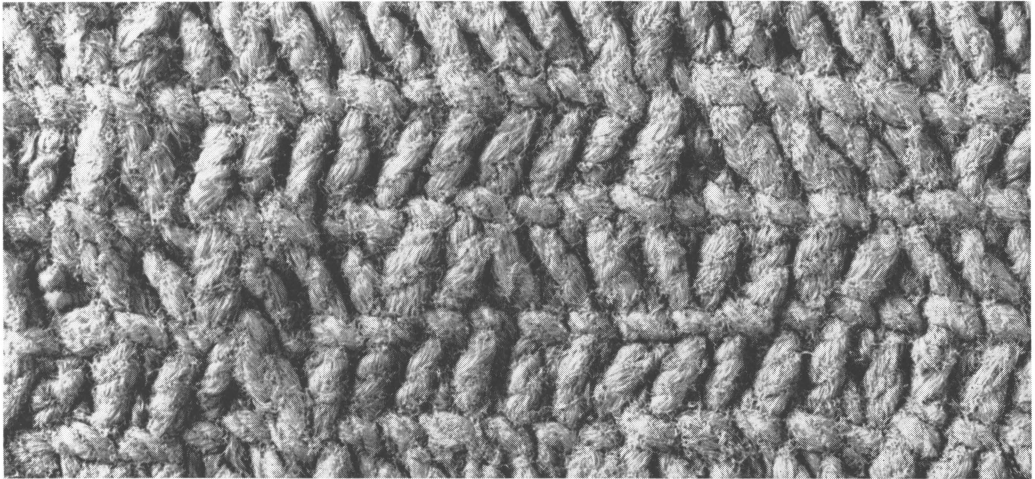


Fig. 1.6—Twined fabric in which pattern is produced by reversing direction of transposed warp; a complex pattern used between 2500 and 1200 B.C. (American Museum of Natural History. Courtesy "Handweaver and Craftsman.")

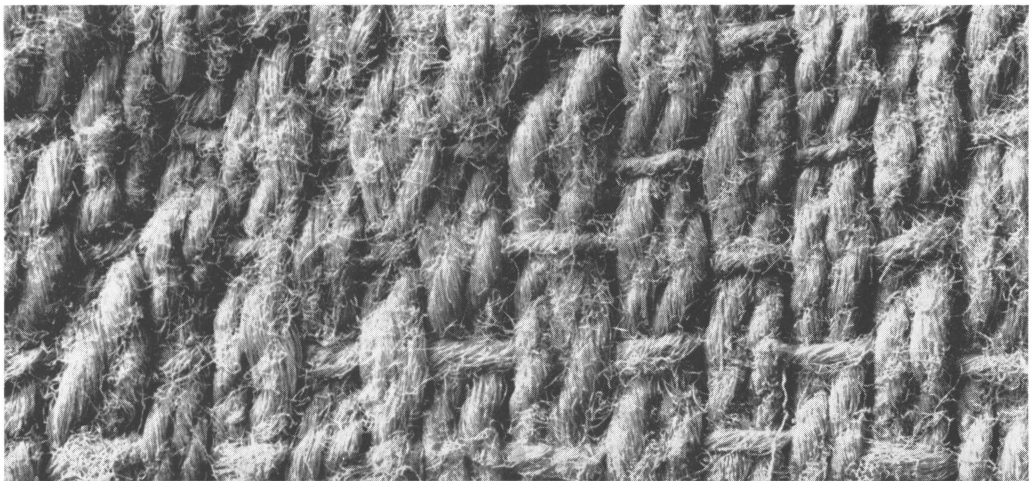


Fig. 1.7—Fragment of a woven textile of about 1500 B.C., using 2-ply warp yarns and single wefts. (American Museum of Natural History. Courtesy "Handweaver and Craftsman.") Illustrations 1.6 and 1.7 are from recent excavations in the Chicama Valley in northern Peru, under the direction of Junius Bird, Associate Curator of Archaeology of the American Museum of Natural History. These findings have brought to light a collection of textiles dating from approximately 2500 B.C. Made of cotton fiber combined with some bast fiber, the methods of construction varied. Unusual weaves as well as unusual uses of yarns occur showing a high degree of skill. Using a single element construction, or one yarn, fabrics were made by a figure-8 looping. Also common was netting, made by knotting or tying a single yarn. Twining and weaving, using a warp and weft yarn, were employed to fabricate cloth, twining being used much more generally. Mr. Bird believes that all of these fabrics were made with the fingers only, as a means of interlacing the weft and warp.

mendously; and, since individual warp yarns could be controlled by this system, the possibilities of pattern were greatly enlarged. This resulted in a period of intricate and elaborate decoration, one that continued through the nineteenth century.

The draw loom was used in Europe until 1787. At that time Cartwright invented the power loom, and, at the turn of the century, the Jacquard attachment appeared. This device made it possible to attain selective warp control through the medium of perforated cards—a principle once employed with music rolls on the old player piano and used today with sorting systems. These inventions marked the beginning of machine production and were the forerunner of equipment used in modern textile mills.

#### ► TYPES OF FABRIC

The type of fabrics created in this vast interim was influenced by the customs and cultures of the various peoples. Examples of many historic textiles are seen in museums today, and the weaver can study these with profit. They not only exemplify the proficiency of the weavers but reflect the religious, political, and economic conditions of their period.

In the early Egyptian period, wool was used very little because of religious reasons. Since it came from animals it was considered unclean and was not allowed in the temples. As early as 4000 B.C. flax fiber was used. Constant preoccupation with linen made the Egyptians skillful in weaving fabrics of unusual fineness and excellent quality. The textiles that have been preserved in tombs, used as mummy wrappings and to cover pottery and relics, were all woven in plain weave with no evidence of decoration.

Although cotton was native to the region, it was seldom used. It has been suggested that the difficulty of separating cotton fibers from the seed may have accounted for the almost insignificant use of this fiber. Cotton did not become important in Egypt until the Christian era when it was used by the *Copts*, as the early Egyptian Christians were called.

Examples of Coptic textiles consist, in most cases, of articles of clothing found in tombs along the edge of the desert. The various designs were usually woven of wool carried out in a brocading technique, and on a linen or cotton warp. These textiles alternately show influences of classic Christian or Mohammedan art, reflecting the political situa-

Fig. 1.8—Fragment of a Coptic tapestry, third or fourth century. (Courtesy of the Detroit Institute of Arts.) These textile fragments, woven of wools in blue, red, pink, and natural, have been found in tombs along the edge of the desert and, in most cases, are articles of clothing. Sometimes the designs were woven into the main part of the fabric, sometimes they were in bands or medallions used to decorate the tunic or other garment. At various times the designs show Classic, Christian, and Mohammedan influences.



tion of the time. Wool was used by the Copts to carry out the motifs, chiefly, it is said, because wool could be dyed so easily.

¶Silk was known in China as early as 3000 B.C.; some authorities say earlier. To produce the silk filament used in fine fabrics, the worm feeds upon the leaves of the white mulberry tree, which is native to China. The importance of silk culture as a national industry was fully appreciated, and for years was a carefully guarded secret. Beautiful silk fabrics that were woven in China were in demand in neighboring countries as early as 700 B.C.

Although the people of Korea and Japan soon learned the secret, it was not until the fifth and sixth centuries after Christ that silk culture





Fig. 1.9—A Hispano-Moresque, eleventh to twelfth century fabric. (Fabric owned by the Cooper Union Museum. Courtesy "Handweaver and Craftsman.") Weave is a compound twill. This motif was called the "Hippocamp" and was popular in early Persian and Byzantine art, having been brought to the West by the Arabs.

was introduced into Europe through the efforts of Justinian, Emperor of Rome. In his desire to have the most magnificent court in Europe, he dispatched two monks to China to learn silk culture. The story relates that when they returned they brought back the eggs of the silkworm and seed from the white mulberry tree concealed in the heads of their bamboo canes.

Following the invasion of the western Mediterranean by the Mohammedans, and during the early development of the city states of Italy, the production of textiles grew at an amazing pace. The weavers then had at their disposal all four of the major textile fibers—wool, silk, cotton, and linen—plus a rich heritage of design compounded of Oriental, Byzantine, classic Greek and Roman, and Mohammedan.

By the time of the Renaissance, Italy had a well-developed silk industry. It was producing silks, velvets, and brocades—fabrics that were in great demand by the churches and wealthy ruling classes. The desire for these textiles spread elsewhere, especially in France and England. By the time Louis XIV ruled France, the French had a virtual

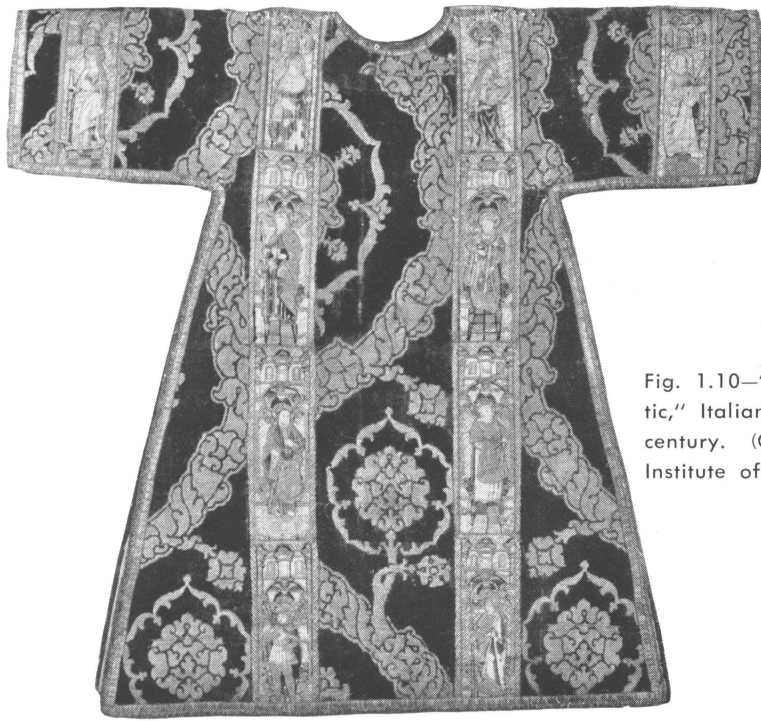


Fig. 1.10—"Velvet Brocade Dalmatic," Italian textile of the fifteenth century. (Courtesy of the Detroit Institute of Arts.)

monopoly on silk production in Europe. Silk continued to be a favorite fabric until the late seventeenth and early eighteenth centuries.

Cotton, although our most important textile fiber today, had not been used by the ancient weavers of the East, except in India. From

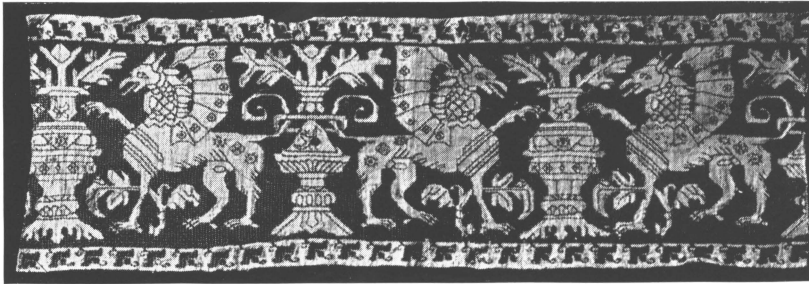


Fig. 1.11—Italian, sixteenth century, border of red silk over drawn thread. (Courtesy of the Detroit Institute of Arts.)

records and literature historians have assigned the first cotton culture to southern India where it reached an advanced stage of development by 800 B.C. In Europe, the weaving of cotton did not become important until after the Mohammedan conquests of the eighth and ninth centuries. They not only introduced cotton cultivation but brought many skilled weavers from the East. The demand for cotton fabrics was greatly increased by the beautiful printed cottons from India which were included in the cargoes of the Spanish and Portuguese explorers. These fabrics were soon reproduced by the weavers of England and France. The vogue for printed cottons replaced the use of silks in the late eighteenth and early nineteenth centuries.

Although wool does not have the historical glamour that is associated with silk or linen, its development is equally interesting. The empires of Chaldea, Babylonia, and Assyria used wool at an early date. It is believed that wool was the chief fiber used there in making clothing. No examples exist of the weaving of these peoples, but they left extensive records engraved on clay tablets that would substantiate this belief. Excavations of the palace sites of their kings in Ninevah, Babylonia, and Ur of Chaldea have brought to light numerous accounts of their magnificent wool fabrics; the records also indicate they had an extensive commerce in textiles, carried on with neighboring countries.



Wool was used throughout Europe from prehistoric times. Caesar gives a vivid account of the plaid and striped materials worn by the Gauls. After the Arab conquest in the eighth century, Spain became widely known for her fine wools.

Sheep were introduced into North America by the Spanish. By the middle of the eighteenth century the Navajos and other Indians of the West were weaving their blankets and rugs from wool. Natural colored fibers and available vegetable dyes were used, but the Indians had no dye that would give them the bright red they admired in the Spanish materials. It was by unraveling the woolen garments containing this color that they secured the red wool seen in the famous Bayeta blankets, so highly prized by the modern collector.

Prior to this time the American Indians wove with cotton. It is known that cotton has been cultivated since prehistoric times throughout the Southwest, and in Central and South America. Although little remains in Central America to prove its claim to early cotton culture, authorities believe the Mayas of that area reached a high state of culture and advancement in textile art as long ago as the sixth and seventh centuries B.C. The pueblos of the Southwest have yielded remnants of cotton cloth, seeds, and the tools for spinning and weaving that date back many years before the Spanish conquests.

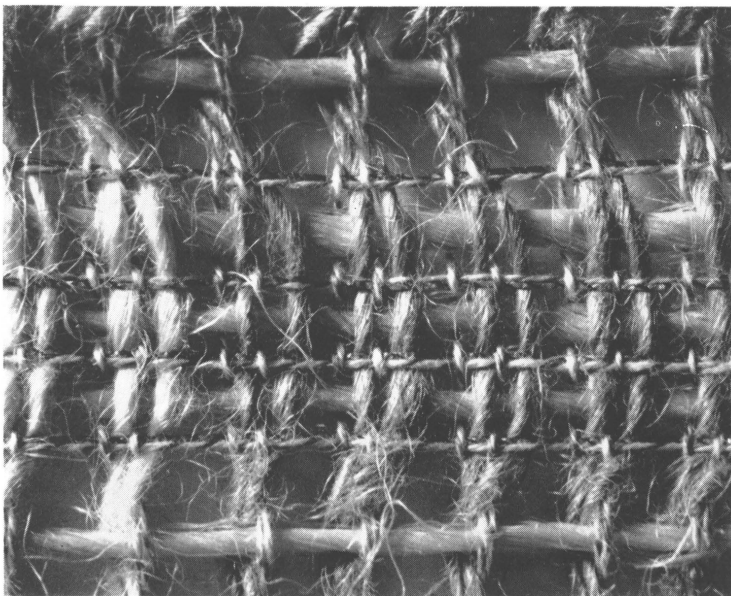


Fig. 1.12—Gauze weave, by Anni Albers. (Courtesy "Arts and Architecture.") Modern example of a very old technique, common among the early Peruvians. In gauze weave, warp yarns are used in pairs, twisted around each other between each weft shot. This twisting is accomplished by using an extra set of heddles, called "doups." Gauze is a common weave used for sheer fabrics because its structure prevents slippage. Marquisette is a gauze weave in common use. This illustration combines a gauze with a plain weave.

## ► TEXTILES IN THE NEW WORLD

Of all the countries in the New World, Peru presents the most interesting background in the textile arts. Although the tools were the simplest, the weaves represent a wide variety, including gauze, tapestry, embroidery or a type of brocade, and the pile weave. Both cotton and wool were used. Cotton grew along the coast; in the mountains, the llama and alpaca furnished wool. Skill in spinning and weaving is evident from the textiles that have been discovered. According to the late Philip Ainsworth Means, an authority on Peruvian culture, the fineness of the cotton yarns was surpassed only by the Dacca cotton of India. In his discussion of Peruvian woolens, he says:

More usually the best woolen threads of ancient Peru ranged from 180 to 200 weft threads to the inch for one ply threads; and from 130 to 190 for two ply. The finest modern woolen threads made from vicuna wool give a weft count of between 70 and 90.<sup>1</sup>

Although the Peruvians had no written history, the Spanish invaders, fortunately, left a vivid description of the country as they found it. The vast treasures of fabrics, tools, and relics found in their burial grounds tell their own story.

Excavations in the Chicama Valley in northern Peru have brought to light a collection of textiles dating from approximately 2500 B.C. to 1200 B.C. Many of the fabrics were made of cotton in combination with a bast fiber. They were constructed by twining and netting methods as well as by weaving.

Early weavers employed the various types of construction in different ways. The plain, twill, and satin weaves each have certain characteristics that suggest their use. Where small, fine yarns were available to the weaver, as in Egyptian linen and the Dacca cottons of India, the quality of sheerness was emphasized by use of the plain weave. The satin weave, which originated in China somewhere around 1000 A.D., was a favorite with silk weavers of that country; this weave brings out the high gloss of the silk fiber as no other structure can. In damasks we generally see a combination of weaves which tend to point up the pattern by a contrast in texture.

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<sup>1</sup> Philip Ainsworth Means, *Ancient Civilizations of the Andes*, Charles Scribner's Sons, 1931, p. 461.

## ► COLOR USAGE

Effectiveness in structure is often achieved with color, and dyed yarns have played a conspicuous role in textiles of all civilizations. There are certain exceptions, as in one period in Peru when weavers utilized the natural colors of fibers, with their cotton graduating in shade from white, through gray tones, to several shades of tan and light brown. Hair fibers from the llama and alpaca also varied from white to gray, to different shades of tan and brown. The natural urge for color, however, manifested itself in primitive peoples who first used stains from berries and the secretion from plants for dyes.

Dyeing involves the use of mordants, such as alum or salt, to fix the coloring matter. The natural pigments used for dyeing were derived from plant, insect, and marine life. Yellow and orange tones came from saffron, an herbacious plant; from resin of the sandarac tree; from Syrian orpiment, a mineral formation; and from many other sources. Carmine and scarlet were obtained from cochineal, a scale insect; blue-green, from the henna shrub; and blue-purple, from the glands of the murex, a shellfish. The roots of the madder plant gave a pigment similar to alizarin, used today in painters' pigments. Today practically all of our pigments are of synthetic origin and have a greater degree of permanency than the natural type.

Throughout history Man has always given symbolic qualities to colors, either from subconscious association or common assent. Churches at one time delegated to certain hues such qualities as penitence, charity, innocence, love, hope, or piety. Purple for centuries was associated with reverence and dignity, and was the prerogative of the clergy and royalty. The Phoenicians obtained this pigment from shellfish in the Mediterranean, and enjoyed a monopoly on Tyrian purple. With the fall of Constantinople, in the middle of the fifteenth century, purple was displaced by the scarlet dye obtained from cochineal, and this color is used today in certain church vestments.

## ► INFLUENCE OF MACHINE AGE

The nineteenth century brought the machine age to fabric production and other industries. With invention of the power loom in 1787 and the Jacquard loom in 1801, handweaving became a forgotten craft in all but a few isolated areas. The transition from hand-loom to power-

loom weaving resulted in a greatly increased output of yard goods, and this in turn was reflected in lower priced fabrics. Efforts to supply an ever-increasing demand brought confusion and deterioration; the old standards of quality and design were sacrificed for quantity production.

In the late nineteenth century William Morris and a group of English writers and artists lodged a protest against commercialism on the grounds of its pretentious decoration and lack of sincerity. This marked the beginning of the Arts and Crafts movement in England, a movement that was dedicated to the restoration of traditional standards.

#### ► STANDARDS OF QUALITY RESTORED

After World War I the industrial art schools in Germany assumed a more liberal attitude toward technology. They recognized the economic importance of the machine—with its ability to produce rapidly and accurately—and the school at Weimar, called the Bauhaus, attempted to effect a reconciliation between art and industry by first breaking down the separation that existed between the so-called “fine arts” and “applied arts.”

New materials and new processes were being discovered and the Bauhaus group sought to correlate an art approach to product development. The basis for improved design was governed by three vital factors: the nature of the raw material, the method of construction, and the particular end use or function of the product. A close integration of these three factors makes an expressive design, one that is obviously related to its purpose. Examples of this intimate relationship between material and construction for a specific function are seen in plant organisms and other forms in Nature.

This school of thought has had a marked influence on architecture, furniture, and other household accessories. The products are characterized by a refined simplicity where the only decoration may be the material itself.

The role of handweaving in today's society is avocational. It makes up for some of the deficiencies of a highly organized industrial system—an age of specialization where the individual is confined to, and responsible for, but one small phase of a total activity. The need for release from the frustrations and emotional strains of contemporary life, as well as an outlet for the urge for creativity, is found in handweaving.

The individual here controls all elements of creating and producing, from the beginning to the final realization. This makes for cultural development and the textile becomes a personal accomplishment, expressing the personality of the weaver, and reflecting his own ideas of usefulness.

Today the individual weaver need not rely entirely on his own resources. This interest in a new and realistic approach to design in the crafts, especially in weaving, is being fostered by various agencies and in schools, where it is included as an integral part of the curriculum in the art or applied art area.