

CHAPTER III.

THE WEAVER.

THERE is no work of woman's fingers that furnishes a better opportunity for the study of techno-geography, or the relationship existing between an industry and the region where it may have been developed, than the textile art. Suppose a certain kind of raw material to abound in any area or country: you may be sure that savage women searched it out and developed it in their crude way. Furthermore, the peculiar qualities and idiosyncrasies of each substance suggest and demand a certain treatment. Women of the lowest grades of culture have not been slow in discovering this; so that between them and the natural product there has been a kind of understanding or co-operation leading to local styles. If these women were moved far away, they carried oftentimes these processes with them and plied the old trade upon such strange materials as they discovered in the new home. The negro women, transported formerly as slaves from Africa to tropical America, found palm trees growing in the Western Hemisphere. They continued to make here the type of coiled basketry they had made in Africa. It is not surprising, therefore, to come upon this art in two hemispheres. In some cases where Indian men have married negro women the mothers have taught the daughters their own arts, and these have come, after a few generations, to consider the arts as indigenous.

It is customary to divide woman's textile industry in

savagery into basket work and weaving. The former art employs more rigid materials, has some stitches of its own, and the products of its operations are vessels made complete in the working.

Weaving, *par excellence*, is the production of a flat textile. It employs usually softer material, its meshes or stitches are plainer, and its products are mats, bags, sails, garments, and the like. The distinction between basketry and weaving, at first, is not well defined, and it will be profitable to consider them together under forms or types of meshes or stitches.

Subsidiary to these chief divisions of the textile art as practiced by women in savagery are spinning, netting, looping, braiding, sewing, and embroidery. Bark-cloth beating, described further on, though Nature does the weaving in this case, is practiced by females in the tropics all round the world.

Each and all of these require tools which the work-women must fashion for themselves. And, though the earth had the raw materials in abundance, it did not yield them without a search which would do honour to the manufacturers of our day.

Basketry in its coarsest form is the making of crates, winding brush in and out to keep the wind or the sun from the wretched habitation, wattling rods and twigs into fish weirs and game drives. There are no savages on earth so rude that they have no form of basketry. The birds and beasts are basket-makers, and some fishes construct for themselves little retreats where they may hide. Long before the fire maker, the potter, or even the cook, came the mothers of the Fates, spinning threads, drawing them out, and cutting them off. Coarse basketry or matting is found charred in very ancient sepulchres. With few exceptions, women, the wide world over, are the basket-makers, netters, and weavers. The tools of the bas-

ket-maker are of the simplest character—those necessary to the harvesting of the material and those used in manufacture. As baskets are made of wood in one place, of bark in another, and of grass, bast, skins, roots, and so forth, according to locality, the tools for harvesting and preparing the material must vary from tribe to tribe. But the one tool that is never absent is the bone awl or stiletto,

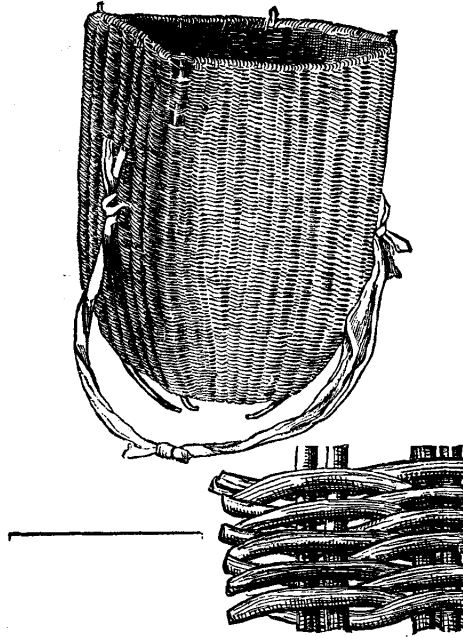


FIG. 9.—MOKI FRUIT PICKER'S BASKET, ARIZONA. (After Mason.)

which is useful with every type of manufacture, and is ever present in the graves of primitive women.

In civilization we are somewhat puzzled in our conception of the word "basket," thinking it always to be something like the homely objects displayed about our

market houses, manufactured by a weaving of pliable splints over a rigid warp. Here and there, even in this coarse modern ware, a diaper effect is secured by the method of crossing the weft and warp, and a fanciful curl will be seen around the borders now and then; but the general plan of weaving is the same. Most of these examples were made by men.

On the contrary, aboriginal woman's basketry excites the admiration of all lovers of fine work. It is difficult to say which receives the most praise—the forms, the colouring, the patterns, or the delicacy of manipulation.

Primarily, her basketry divides itself into two sorts or types—the *woven* and the *sewed*, the former built up on a warp, the latter produced by the continuous stitching of a coil. Of these two main classes there are many subclasses, which have been necessitated by the nature of the material which the fabricator has at her hands and by the uses to which the products have to be put.

Woven basketry occurs in the form of plain weaving, wickerwork, and twined weaving. A diaper effect is possible in each. Plain or chequer weaving is effected when warp and weft are made of fillets having the same thickness and flexibility. The effect is that of the commonest bagging or cotton cloth. The bottoms of our common splint hampers are chiefly made thus.

Now, when the pristine artist desired to vary this chequer type, she had several possible methods from which to choose.

Among the Algonquin tribes of North America the women had learned that birch and other woods grow in layers. They also discovered that by beating a log or stick of this wood at the proper time of the year the annual rings or layers could be made to peel off. This gave them thick shavings of tough wood, of uniform thickness, which they could cut into ribbons and weave into chequer-



FIG. 10.—THE BASKET-MAKER—CALIFORNIA WOMAN AT WORK. (After Henshaw.)

work basketry. The bottom of a Polynesian basket and of an Algonquian basket look precisely alike, though of quite diverse material. In the tribes along the Pacific coast of Washington and British Columbia women treat the tough cedar bark in the same way, and, following the Algonquian method, a great many civilized basket-makers manufacture coarse market hampers in the checker pattern.

One step upward from this plain work was secured when the weaver bethought herself to let each strip overlap two or more instead of one warp strip. This would secure on the surface, still flat, a diaper or diagonal effect, the same as in fine linen weaving. Examine a fish wallet from the Clallams, of the State of Washington, or, much finer, the black and brown ware from Guiana, and it will be seen that the tasteful effect was secured by the simple counting of one, two, three, over and under, from beginning to end.

Further ornamentation of chequer basketry is effected, either in plain or diaper varieties, by dyeing the strips of different colours and working them with proper alternation, producing geometric designs of great beauty.

Finally, these ingenious savages had not failed to discover that the thin strips need not be all of the same width. This was a very happy thought, enabling the weavers to achieve such effects as we should get by manufacturing cloth from ribbons of varying widths and colours. The Samoan Islanders were very happy in this style, using only black and white strips of palm leaf.

Imagine, now, that the savage woman in her wandering has come to the country of twigs, of osiers, of rattan, of reeds, and has got somewhat out of the track of palm-leaf, or cedar-bark, or hard-wood splints. Her effort to produce plain, flat chequer weaving would not succeed. Just as likely as not women learned their first lesson on

twigs and wattling; in that case, by reducing the size of her material, she arrived at the door of the modern basket-maker. Her ware became wickerwork by an understanding between her and her material. The philosophy of the texture is that the warp splints or sticks remain practi-

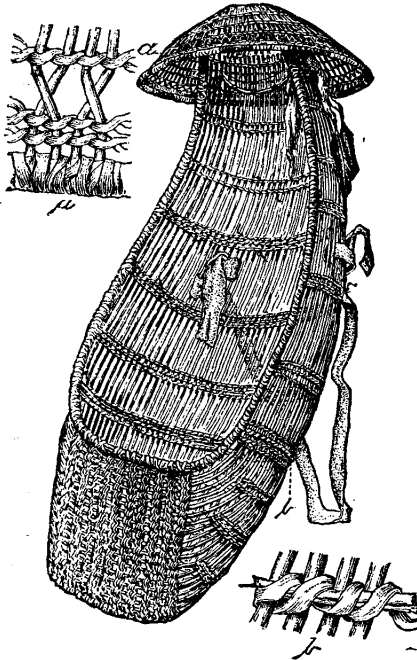


FIG. 11.—TWINED WEAVING BY HUPA WOMAN, NORTHERN CALIFORNIA.
(After Mason.)

cally rigid, and the weft pieces bend out and in, over and under the warp pieces, in alternate rows. This gives to the surface of all such work a ridged or wavy appearance.

Still keeping within the notion of weaving, we now come to a type of basketry which must have been in use before womankind separated over the earth at all. I have

elsewhere called it the "twined pattern," because the weft is a genuine two-ply twine. It can be easily learned, and its possibilities are endless. In one country it will be made of the root of the spruce, in the next of bark, in the next of twigs, and before we shall have gone the round we shall find twisted threads of the finest material wrought therein.

The warp of this kind of ware is rigid, and is designed to be entirely concealed. The woof is double. That is, the basket-maker takes two weft strands around at a time and gives them a half twist or half twine between each pair of warp strands, pushing her twine down close upon the preceding as she goes on. This last step is not necessary, however, as many open-work pieces are to be seen.

If the reader will think a moment, or drive a few pins in a row along a soft board, and with a coloured and a white cord make a row or two of twined weaving backward and forward, what I am about to explain will be better understood.

In the first place, the twines can be driven so close together as to make the vessel water-tight. Many of the pots in which the aborigines boiled their food by means of heated stones are made after this fashion.

Again, if the root or grass be homogeneous in size throughout, the effect will be uniform and extremely pleasing. Furthermore, by using two colours in the twine each row will be spotted and the spots of adjacent rows up and down may match or alternate so as to give rise to an endless variety of geometric effects. Once this style was mastered by any tribe, its capabilities were illimitable. Many thousands of specimens of pottery are found in the Eastern United States marked on the surface with this very twined weaving, showing that women before the advent of the whites were familiar with it.

So primitive is the twined style of basketry that speci-

mens from East Africa resemble almost undistinguishably others from Alaska. The wattling is so simple as to suggest itself again and again to various peoples. Yet this very twined or wattled style is capable of the most delicate finish on the surface. In the first place, both elementary strands of each twine or either one may be plain or dyed. And the combination may be changed at each round or at any time. This fact alone gives to the basket woman the greatest possible scope of decoration. But, as at each half turn or twine she has a double stitch, half inside and half outside her basket, it is possible to embroider any figure she likes entirely on the outside without going more than half through the texture. The figure will be on the outside and not appear on the inside at all. Furthermore, there is nothing to prevent her twining her strands across two or more warp twigs, which, indeed, she does, producing a diaper effect all over the surface. The most beautiful specimens of this twined ware embroidered on the outside are wrought by the women of southeastern Alaska; but the Shoshone and Apache women weave a coarser variety and dip it into hot pitch to make indestructible water bottles. These far excel goatskins, or pottery, or metal canteens for durability and lightness.

The African women practice the twined stitch chiefly on flexible sacks. In the mound and surface pottery left by the ancient Americans, frequent marks of this twined or string weaving are deeply imbedded, leaving the conviction that nets or baskets were used by the ancient potters.

The second class of basketry is the coiled or sewed variety. The most simple as well as the most beautiful types come from Siam and the other lands of the bamboo. The basket-maker provides herself with a number of small rods and a quantity of split bamboo of uniform thickness. The rods are coiled like a watch spring, and united firmly

by wrapping a splint of bamboo around two rods continuously from the centre of the bottom of the basket on to the last stitch on the border. As the work goes on the splint passes between two stitches of the preceding round and over the fundamental rod.

Ware quite as beautiful as that of the far East may be seen in the spruce country of North America, where the fine roots furnish a tough and uniform fiber when split.

Now, suppose that the woman in sewing her coil introduced a thin splint or some tough grass between her rods in going around; that would furnish a kind of packing or caulking, which would render the work water-tight. And that is the case with the Indians of British Columbia and Washington in making the baskets in which they boil their food by means of hot stones.

Going farther south, the fundamental rod becomes a bunch of coarse grass or the split stems of palm or other tropical plant. The sewing in such cases is done with stripped yucca or finely split and dressed splints of osier or *rhus*, or stems of grass, so nicely and homogeneously dressed as to enable the maker to produce a basket with hundreds of thousands of stitches over the surface which do not show the slightest variation in size.

Great variety is secured in this ware by the material, by the use of coloured stitches, and by the introduction of birds' feathers, beads, and other decorative objects into the texture.

In the arctic regions spruce root is the material with which the coil is sewed. In California it is split osier and *rhus*. In the Moki Pueblos it is extremely finely divided yucca fibre, while the stems serve for the body of the coil. The tropical regions of both hemispheres abound with palms of many varieties whose leaves when split supply the very best material for the coiled ware.

In Tierra del Fuego, as well as in Japan, the basket-

maker produces an attractive variety in the coiled stitch by passing once around the standing part of the sewing splint, then between the coil rods, down, through, back, and over, to repeat the process for each stitch. Of all the varieties there are many subtypes too intricate to mention here. We have all the generic forms.

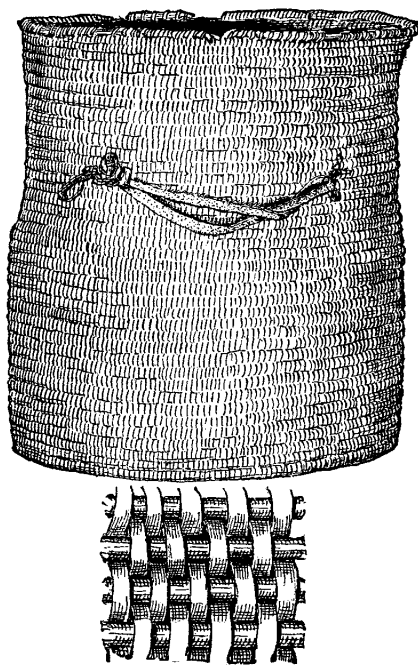


FIG. 12.—COILED WEAVING BY UTE WOMAN, UTAH. (After Mason.)

Mr. F. V. Coville says that the Panamint Indian women, of Death Valley, California, make their baskets of the year-old shoots of tough willow (*Salix lasiandra*), the year-old shoots of aromatic sumac (*Rhus trilobata*), the long black horns on the pods of the unicorn plant (*Martynia probos-*

cidea), and the long red roots of the tree yucca (*Yucca brevifolia*). The first two named give the light wood colours, the third the black colour, and the fourth the red. The women prepare the willow and the sumac in the same way. The bark is removed from the fresh shoots by biting it loose at the end and tearing it off. The woody portion is scraped to remove bud protuberances and allowed to dry. As these Indians make coiled basketry, the rods just described form the basis of the work. The splints for sewing are prepared as follows: A squaw selects a fresh shoot, breaks off the too slender upper portion, and bites one end so that it starts to split into three nearly equal parts. Holding one of these parts in her teeth and one in either hand, she pulls them apart, guiding the splits with her hand so dexterously that the whole shoot is divided into three nearly even portions. Taking one of these, by a similar process she splits off the pith and the adjacent less flexible tissue from the inner face and the bark from the outer, leaving a pliant, strong, flat strip of young willow or sumac wood. This serves as a fillet in sewing or whipping the coils of the basket together, or in twined basketry two of them become the weft or filling. The coiled basketry is most carefully made. In the olden times a stout, horny cactus spine from the devil's pincushion (*Echinocactus polycephalus*), set in a head of hard pitch, furnished the needle. When grass stems are carried around inside the coil with the shoot of willow or *rhus* they form a water-tight packing for the pot baskets. Patterns in red and black are wrought in by means of fillets from the *martynia* or fern root.*

In Matthews's Mountain Chant it is asserted that the Navajo, before they learned to weave blankets, made mats of grass to lie on and to hang in the doorway and fine

* Coville, Am. Anthropologist, vol. v, p. 558.

cedar mats to cover themselves with. The soles of the moccasins were made of hay and the uppers of yucca fibre.* I have elsewhere alluded to the delightful confusion of time and place in this myth. When we recall that the ancestors of the Navajo journeyed to Arizona from Alaska by way of the Pacific coast we are not surprised to find mats of grass and shredded cedar bark and yucca fibre in the same sentence.

A careful study of all woman's work in basketry, as well as in weaving and embroidery, reveals the fact that both in the woven and in the sewed or coil ware each stitch takes up the very same area of surface. When women invented basketry, therefore, they made art possible. Along with this fact, that each stitch on the same basket made of uniform material occupies the same number of square millimetres, goes another fact—that most savage women can count ten at least. The production of geometric figures on the surface of a basket or a blanket, therefore, is a matter of counting. If the enumeration is correct each time the figures will be uniform.

Now, many of the figures on savage basketry contain intricate series of numbers, to remember which cost much mental effort and use of numerals. This constant, every day and hour use of numerals developed a facility in them, and, coupled with form in ornament, made geometry possible. The Polynesian and Melanesian club carver transferred this style of decoration to his woodwork, but the ever-present geometrician of savagery is the woman basket-maker. She knew lines, triangles, squares, polygons of all sorts, meanders and a set of cycloidal curves.

In the chapter on pottery it will be shown how the plasticity of the material rounds off the corners of this rectilinear, and makes the beginning of curvilinear geom-

* Matthews, Fifth An. Rep. Bur. Ethnol., p. 388.

etry. Many savage basket-makers, on the other hand, in trying to represent birds and clouds and the human form on their geometric material, conventionalized them, and then abridged these conventionalities, until they produced forms that might be the envy of Cairene rug weavers.

These ancient forms are nowadays copied by pattern drawers for all sorts of work, and the needlewoman and lace-maker of our day follow the lead of their primitive sisters without being aware of it.

Akin to basket and mat making art is hand weaving, or the making of fabrics with the hands, without any frame or machinery whatever. The Mexican and Panama hats are thus produced, and travellers in Africa tell of negro women who sit on the ground with a bundle of split palm leaf by their side and work most delicate matting and other articles with the fingers alone.

The New Zealand and other Polynesian women manufacture mat robes with long pile after the same fashion.*

The fillets from which all of these kinds of hand weaving are done are not twisted, but are either straws or leaves, or bast split finely and evenly. The woman commences in one corner of the piece, and works diagonally toward the opposite corner or end. Instead of carrying each fillet its whole length through a series of warp threads, as in loom weaving, she makes a loop in each fillet as she progresses two or three inches from a starting point, runs this short loop in and out through a dozen or more strands of the series of warp fillets at right angles, and then draws the long end of her fillet through. In the same manner she treats this whole set of fillets, and then takes up the warp set, crossing these in the same manner through the weft. By doubling her strands and making short excursions she

* See Ellis. *Polynesian Researches*, vol. i, p. 186. Compare Turner, *Samoa*, London, 1884, p. 120.

keeps all her work along parallel, and avoids tangling. She believes in the tailor's method of short threads for quick work. To weave a mat with long pile, it is only necessary not to use up a few inches of each end of her fillets, but to let them remain as fringe and pile. Some of the New Zealand mats woven after this fashion are three feet wide and nine feet long.

Another kind of textile, if we might use the term in this connection, is the result of beating out the bast or inner bark of certain trees. In Mexico, all over Central America, in the South American states certainly as far south as the tropic of Capricorn, throughout equatorial Africa, in Oceanica, both among the brown and the black peoples thereof, culminating in Hawaii, is to be seen a lace-like fabric with fibres intertwining like paper or felt, or in coarser fashion. Some pieces thus made are of immense size. There is one in the National Museum in Washington forty feet long and over ten feet wide. In the Australasian area the stuff is never cut into garments, but is made up into long bolts, as we make calico, and stamped with patterns, some of which are exceedingly attractive. In America men as well as women manufacture the cloth. Indeed, it is said that the India-rubber gatherers, when an old tunic becomes too much soiled and infested, have a knack of beating a clean shirt out of a single cylinder of bark. All of the costume of the Andean tribes, decorated with shells, teeth, seeds, and feathers, has the bark cloth for foundation.

In Hawaii the manufacture of bark cloth was the work of women exclusively, and the female chief took pride in the sheets of paper-like cloth she had formed by her own skill and toil. A log of hard wood, smooth on top, a variety of hand clubs, and calabashes, to hold water or mucilaginous fluids, were all the instruments necessary in the manufacture of *kapa* or *tapa* ("the beaten"). The

sound of the beater upon the log was quite musical, and the women are said to have signalled to one another thus from settlement to settlement.*

The bast of the cottonwood, the willow, the linden, the cedar, will not make *tapa* or bark cloth, but the good woman of the forest many centuries ago discovered that it will fray or fringe or shred under proper treatment, and so she applied her ingenious mind to this operation. Introductorily to this art, as into all other arts, fingers preceded tools: So she set to work fraying long pieces into fringes, out of which she made petticoats or divided skirts.

But farther north, from Columbia River to the Frazer mouth, to heckle the fibrous cedar bark, she drove two short stakes into the ground, fastened a cross piece to their tops, and then, with a dull chopping or breaking knife of bone, separated the filaments until they resembled silk.

The Indian hemp (*Apocynum cannabinum*), common over the United States and Canada, was treated as modern spinners treat flax to remove the tough fibre, and in South America cotton was gathered and picked from the seed by hand. These simple processes were repeated in Africa and in Polynesia, in Mexico and Central America, in each case upon pita fibre or palm leaf or cocoa bark, as the region suggested.

Among these rude inventors of thread-making the woman who worked in sinew is not to be forgotten. She removed the tough tendon from the back or leg of the deer and other mammals, dried it in the sun, and then scraped and shredded it as long as fibres would separate. Owing to the toughness of the material and the long "staple," this process of separation could be carried to any degree of tenuity. Some of the thread of the Eskimo

* Brigham, Bishop Mus. Catalogue, Honolulu, 1892, p. 23. Ellis, Polynes. Res., vol. iv, pp. 109, 179, 184.

women is quite fine enough for our smallest sewing needles.

Twining, twisting, spinning, yarn-making, antecedent to netting, looping, braiding, or weaving, were begun in

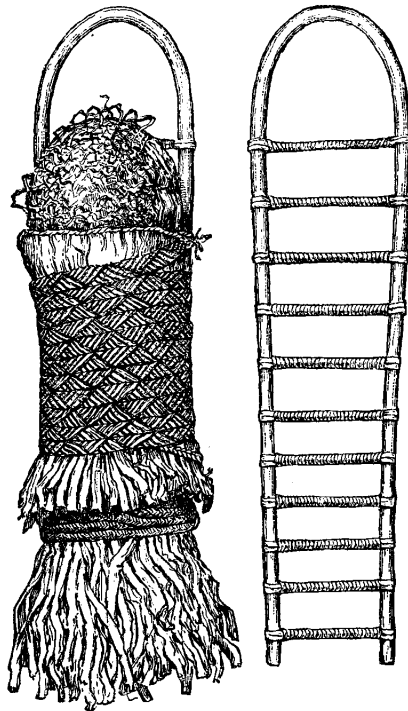


FIG. 13.—MOHAVE CRADLE FRAME, SHOWING THE SHREDDED BARK BED, THE FRAMEWORK, AND THE GEOMETRIC PATTERNS IN WEAVING.

savagery by rolling a small bundle of fibres or a narrow strip of bast between the palm of the hand and the thigh, after the fashion in which the cobbler untwists his thread to break it.

Among some tribes a twisting device consists of two

pieces of wood, bone, or ivory, as the case may be, one revolving on the other, as in a watchman's rattle. The fibres are attached to the revolving part, and made to twist by its revolutions. The Eskimo and the Zuni women both use this process, especially in heavy work.

The same fly-wheel arrangement used by the Eskimo women in making sinew thread is applicable to the twisting of twine from two or more spindles; indeed, the apparatus is better adapted to the production of stout cord and lines, the motion being slower, while the momentum is greater. The tool, therefore, is more suggestive of the ropewalk and the devices connected therewith than of the spindle. I have found the apparatus in use among the Eskimo for making rawhide lines, and among the Pueblo peoples for twisting stout twine and rope. African women have a still simpler process of manufacturing excellent twine, which is also to be seen among Sicilian women. The whole process of twisting the filaments and the twine is carried on by one person, who takes four rushes or a double set of bast or other filaments between the thumb and forefinger of the left hand, twirls one set four or five times quickly about the forefinger of the right hand, passes them under to be held between the fingers and palm of the left hand, and deftly seizes the other set at the same time to give them a twirl. This process is repeated with the strands alternately, the finished twine being drawn along simultaneously. The Alaskan Indian women also know this process of making twine just as our boys twist whip crackers, twisting and twining with both hands at the same time. The finished part is fastened to some object or held by another person.*

But the world-wide method of twisting yarn from the

* See Kalm, *Travels*, London, 1771, vol. ii, p. 131.

most primitive times and among very uncultured peoples has been with the spindle. The distaff at first was absent. The workwoman held a bunch of prepared fibres in her left hand and spun with her right.

The rudest spindles were merely straight sticks, with no hook at the upper end, but the fly wheel or spindle whorl is as old as the hills. To imitate the originator of the spinning jenny, take a bunch of flax or wool in the left hand, and with the right draw out the fibres a foot or two in a homogeneous thickness, and fasten the ends securely to the top of the spindle shaft. At first it is better to sit on the ground and let the lower end rest in a little cavity of a rock or in a bowl. Twirl the spindle and twist the yarn as much as you desire, then wind the part twisted on the spindle shaft, draw out another bunch of fibre, and give another twirl. The process, in effect, is precisely the same as that followed by our grandmothers, only the spinning wheel reduced greatly the time of the operation. In Roman and Grecian and Egyptian sculptures and paintings the spinner is standing and twirls the spindle in the air, but the shaft in such cases must have a hook at the top. The spindle is used by the spinning and weaving Indians of North America throughout the entire operation of twining. It reduces the wool to yarn, and then serves as a spool for it. It subsequently twists the yarn for two- or three-ply twine. It is an interesting sight to watch an Indian woman's dexterity as she twirls the spindle on her bare thigh and drops the end into a vase or bowl while the yarn is wound. It has scarcely ceased its rapid revolution before her right hand is ready to pick it up, carry it to the top of the thigh again, and give it another impulse. The motion is practically continuous.*

* Bancroft, *Native Races*, New York, 1874, vol. i, p. 698.

Thomson noticed a very primitive type of spinning at Bâkah, in Palestine. "Some of the women were spinning thick strands of goat's hair, with which coarse sacks, bags, carpets, and tent covers are woven. They use no spindle, but merely fasten the strands to a stone, which they whirl round until the yarn is sufficiently twisted, when it is wound upon the stone and the process repeated over and over."* They can weave without any loom. The threads of the warp are stretched upon the ground and made fast at either end to a stout stick. The threads of the woof are passed through with the hand, and pressed back by a rude wooden comb.†

To save their plaiding coats some had
Upo' the haunch a bonnet braid,
Or an auld wecht or kairding skin
To rub and gar the spindle rin
Down to the ground wi' twirlin' speed,
And twine upo' the floor the thread.

Old Scotch ballad. CHAMBERS'S ENCYCLOPÆDIA, 1892, s. v. "Spinning."

In the art of braiding sennit from cocoa fibre the Polynesians excelled, and men as well as women engaged in making it, because it was of use to men quite as much in their arts as it was to women, taking the place of nails and screws in housebuilding and boat-making.

But savage women in other parts of the world could braid or plait also. In America they were most skillful in giving a plaited effect to borders of baskets and wallets in the use of a single strand by the continuous loop. The modern straw hat is a survival from savagery. Indeed, the braids of them are still made either by savages or by white women who live in a very primitive state.

Weaving is the climax of the textile industry. The

* Thomson, *The Land and the Book*, New York, 1880, vol. i, p. 80.

† *Ibid.*, p. 195.

very simplest form of loom, out of which might have grown the most intricate of modern patents, is to be seen in use among the savage women of British Guiana in making their *queyus* or embroidered aprons. The frame consists of two rods, one flexible and bent in a semicircle, the other straight and having its ends tied to the ends of the former. In form it resembles the letter D. The warp threads pass from one stick to the other, widening apart slightly on the bent one, and giving to the finished apron the form of a right trapezoid.

The ancestral form of the heddle or heald in a hand loom was, in the earliest looms, a rod laid across the warp and attached to the hinder or under series of warp threads by a continuous thread, which passed around the heald rod and around these hinder warp threads all the way across the warp. The weaver crossed her warp for the shuttle by simply pulling this heald rod forward, passing the shuttle through, and then letting go for the next passage of the weft, the warp readjusting itself by its own tension. Her shuttle was nothing more than a slender stick upon which a quantity of yarn was wound, and this was guided between the two sets of warp threads slowly by the fingers as in darning. This thread was pressed into place by means of a baton made in shape of a sword blade. Sailors use a similar but clumsier device in making sword mats. The warp threads were crossed by pulling or releasing the heald and the tedious shuttle was worked across and back, occupying a minute with each excursion.

In later times any number of these heald rods could be employed to give a diaper effect, but in the beginning this was produced by counting warp threads and carrying the right number in the mind, a surprising phenomenon to one who has patiently watched a Zuni belt weaver. While the modern processes are of immense advantage in rapid-

ity, the savage weaver could interrupt her darning process at any point and introduce fresh colour, working in each independently, just as tapestry is built up.*

Among all the types of modern savagery—American, negroid, and Malayo-Polynesian—intricate processes of weaving were in vogue before they were approached by the white race.

In American and European factories cotton and wool are sorted, carded, and spun by machinery tended by women. The goods are then made into bales, shipped, sold by wholesale, and delivered to retailers by men. They pass out of the hands and sight of women until they reach the retailer or the manufacturer of garments, where



FIG 14.—THE PRIMITIVE LOOM WEAVER
—NAVAJO WOMAN, ARIZONA. (After
Matthews.)

they are again in the hands of their original owners, to be made up, as any one will testify who has looked into a retailer's shop or a tailoring establishment.

In the last operation of using up these goods the aborigines of America, Africa, Polynesia, and Australia have a share. The looms of Europe and of the United States have to cater to the demands of the savage women of these areas. This is especially true in Africa, where the traders' goods must be *au fait* or the women will not have them.

In comparison with this complex and world-embracing activity of modern weaving and commerce, how simple

* Minutely described by Matthews, Third Annual Report of the Bureau of Ethnology, Washington, 1881-'82.

the process in savagery! The women there go to the fields or to the animals for the fibre, or hair, or wool. They transport the material on their backs, in carrying frames and apparatus that they themselves have made, and prepare it, as we shall see further on, to be woven or sewed or embroidered. They make up the bag, or mat, or garment, or sail of a whole piece, and wear it out in use—the same woman in each case following the material from the cradle to the grave.

In lower savagery, indeed, this same woman has to be adept in many other crafts beside, but in upper savagery the skilled weaver is pensioned or allowed to do that work only. When she arrived thus far on her upward journey, she was prepared to hand the art over to the male sex and to machinery, in whose workings she will still bear a part.* The finer kinds of cloth in Mexico were made of cotton, of rabbit hair, of the two mixed, or of cotton mixed with feathers. The rabbit-hair fabrics were pronounced equal in finish and texture to silk, and cotton cloths were also fine and white. The cloth in the manufacture of which feathers were employed often served for carpets, tapestry, and bed coverings. Maguey fibre and that of coarse palm leaf—*icxotl* and *izhuatl*—were woven into coarse cloths, the maguey cloth being known as *nequen*. This *nequen* and the coarser kinds of cotton were the materials with which the poorer classes clothed themselves. All the work of spinning and weaving was performed by women.†

At the Chicago Exposition were immense collections from the cliff dwellings, containing, among many other relics of woman's handiwork, feather cloaks used as

* Adair, History of the North American Indians, London, 1775. Dilly, p. 423.

† Bancroft, Native Races, New York, 1874-'76, vol. ii, p. 484.

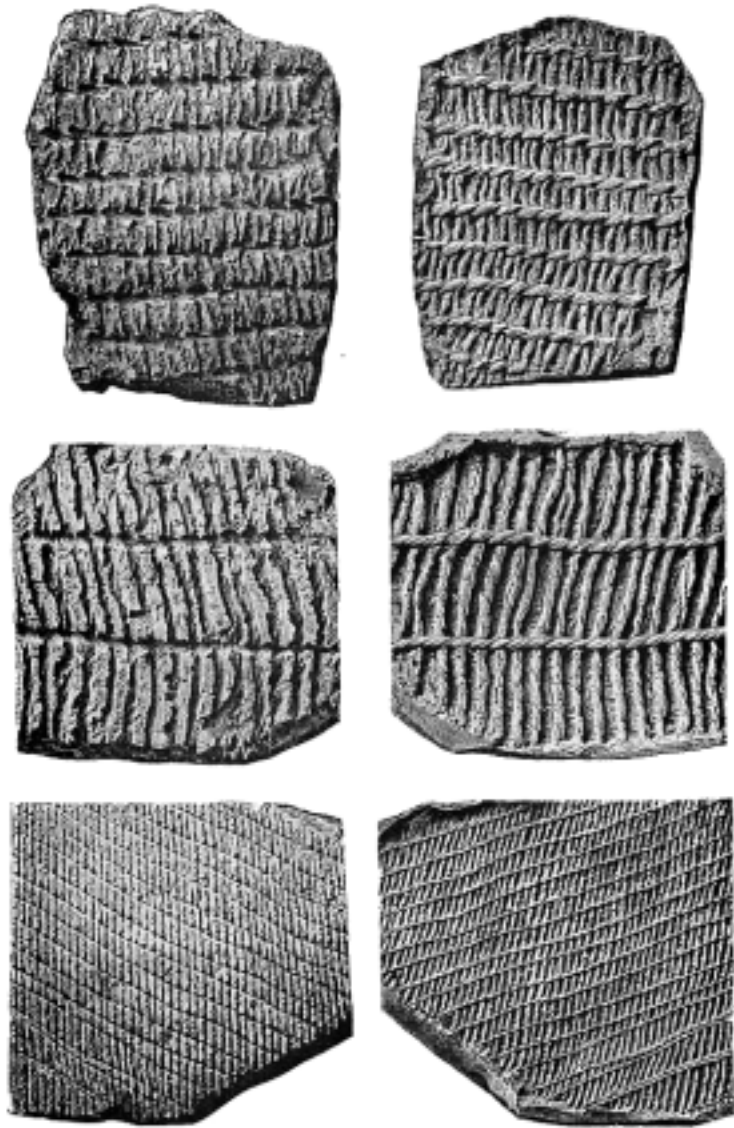


FIG. 15.—IMPRESSIONS OF TWINED WEAVING ON ANCIENT POTTERY. (After Holmes.)

shrouds or wrapping of mummies. These cloaks were made in "twined weaving" of cords wrapped with the downy feathers of the turkey or rabbit skin. The skin of the rabbits and of the birds after the quill feathers had been plucked was cut in strips and wound around the warp and the weft cords, as in the rabbit-skin robes of the Pueblo peoples. In some examples the soft quill feathers had been split and wrapped around the cords.

The process of weaving is thus described by Wafer: "The Women make a Roller of Wood, about three Foot long, turning easily about between two Posts. About this they place Strings of Cotton of three or four yards long, at most, but oftener less, according to the use the Cloth is to be put to, whether for a Hammock, or to tie about their Waists, or for Gowns, or for Blankets to cover them in their hammocks, as they lie in their Houses, which are all the uses they have for cloth. And they never weave a piece of Cotton with a design to cut it, but of a size that shall just serve for the particular use. The threads thus coming from the Roller are the Warp; and for the woof, they twist Cotton yarn about a small piece of *Macaw* wood notched at each end. And taking up every other Thread of the Warp with the Fingers of one Hand, they put the Woof through with the other hand and receive it out on the other side; and to make the Threads of the Woof lie close in the Cloth they strike them at every turn with a long and thin piece of *Macaw* wood like a Ruler, which lies across between the Threads of the Warp for that purpose."*

Another example of a textile art involving a multiplicity of occupations is to be found in the Carib tribes of South America. They have got far enough along to have

* Laet, Nov. Orb., p. 348, quoted by Bancroft, Native Races, 1874, vol. i, p. 766.

plantations of a primitive sort. So the women plant the cotton seed and cultivate the crop. They pick the cotton, remove the seeds, and card it into long, loose bands. Winding one of these about her right wrist, the spinner then fastens one end of the band to a spindle, which she twirls with her left hand, drawing out the band evenly meanwhile with both hands and taking up the thread on the shaft of her spindle. When she has completed a number of these she by the same process combines two threads or three into a twine, and now she is ready to become a weaver. Four pieces of wood are set up, for all the world after the manner of an old-fashioned quilting frame, around which she winds in a continuous coil enough string to form the warp of her hammock and adjust the distances to a nicety. Across this warp she weaves bands of three-ply plaits at equal distances so as to hold the warp firmly in place and give air through the texture. The men apply the ropes or "scale lines."*

Nothing in handicraft has ever exceeded in beauty featherwork. The feather plumes and canopies of the Incas, the shields and mosaic work of the Mexicans and Central Americans, the war bonnets and other regalia of eagles' feathers among the Northern tribes, have not failed to evoke unbounded admiration from the conquerors.

In India travellers admire the fans and screens made from the plumage of pheasants and peacocks. The old Assyrian kings were attended by servants holding immense umbrellas of feathers. In New Guinea it is the bird of paradise and the cassowary that provide the gaudy material for head ornaments, while the Australians went to the emu and the lyre bird for supplies.

Throughout Polynesia, as elsewhere, feather currency was in vogue, but the Hawaiians, after all, seem to have

* Cf. Im Thurn, *Indians of British Guiana*, London, 1883, p. 285.

excelled in the art of weaving with feathers. Helmets, cloaks, standards, and necklaces were most elaborately wrought on network of the *olona* fibre (*Touchardia latifolia*). The arrangement of the feathers is said to have been the work of noble women.*

Colours in textiles are produced first by the happy mixture of natural materials of different tints. Often the two sides of a leaf will give distinct colours, as in the case of the yuccas (out of which the Moki women of Arizona make the pretty and substantial meal trays), or the palm leaves abounding in the tropics. The California women get a black effect with *martyria* pods, a deep brown with the stem of the maidenhair fern, and a bright red in the use of the roots of a yucca. These added to the wood colour of different plants produce a pleasing variety. The women of our Pacific coast have found out that burying spruce root and other woody fibres in certain springs or muds produces a chocolate colour, and natural dyeing may be found elsewhere. But our primitive folk also know how to make dyes from mineral and vegetal substances and how to fix colours by means of mordants. Until the discovery of the coal-tar dyes—a plague upon them!—the most commonly used colours were those borrowed from the hands of savage women.

The Navajo woman since the introduction of sheep into Arizona by the Spaniards has died wool in a good variety of colours, partly with her native dyes and partly with new materials. Ingenuity of no trifling order is shown in this combination. The wool itself occurs in three natural colours—white, rusty black, and grey. The native dyes are black, yellow, and reddish. Black is produced by boiling the leaves and stems of *Rhus aromatica* (sumac) and mixing the decoction with baked yellow ochre

* Consult Brigham, Cat. Bishop Mus., Honolulu, 1892, p. 10.

and piñon gum (*Pinus edulis*). Though the Navajo woman is not skilled in modern chemical terms, the tannic acid of the sumac combines for her with the sesquioxide of iron in the roasted ochre to form a rich blue-black ink whose colour is deepened by the carbon of the gum.

For yellow, the flowering tops of *Bigelovia graveolens* are boiled and the decoction mixed with almogen or native alum, and this gives her for use a lemon tint. Or, for "old gold" she grinds on her metate of stone a root of which our science is ignorant, and for a mordant mixes therewith the native alum.

Her reddish dye is extracted from the bark of the *Alnus incana* and the root of *Cercocarpus panifolius*, the mordant being fine ashes of the juniper. On buckskin this produces a brilliant tan colour, but a paler shade in wool.

Dr. Matthews thinks they formerly had a blue dye of their own, which they abandoned for indigo. The native blue with native yellow would have given them green; at any rate, they now mix indigo with their native yellow.

The brilliant red threads in their best modern blankets were procured by unravelling *bayeta*, a bright scarlet cloth with a long nap, much finer than the strouding which is so dear to the heart of the Indian women of the North.*

In Hawaii, roots, leaves, and bark of various plants yielded dye stuffs, the chief colours being yellow, red, green, various shades of browns, and the greys, produced by an admixture of charcoal. It was customary to prepare a kapa intensely imbued with colour, and keep this for use as solid pigment to be beaten into white kapa. For producing figures, pigments were ground in oil in a stone mortar and applied (1) by cords dipped in the liquid and

* Matthews, Navajo Weavers, Third An. Rep. Bur. Ethnol., Wash., 1884, p. 376.

snapped as a quilter's starch line; (2) by pens of bamboo; (3) by brushes; (4) by natural objects used as dies; (5) by stamps cut on bamboo strips. In some islands elaborate stamps were made several feet square.*

The subsidiary textile arts are of great importance in savagery, and they are of great antiquity, remains having been found in very old deposits. Sewing and embroidery will be noted further on in the study of the skin-working art, but in this place it is important to observe the net. The "reef knot" and the "weaver's knot" were both known to savage women, but there are simpler forms conducting up to these. Imagine a row of trees leading to a pitfall. If a stout vine were carried along this row, being wrapped once around each tree in passing, it would form an excellent "wing" to the trap. Three or more would furnish a good fence, and the whole suggests a very simple form of net. The Mojave Indian women living about the mouth of the Colorado River construct a carrying basket in this very way. A number of upright strings connect the hoop at the top with the bottom of the basket. The meshes are formed by wrapping a stout string around and around the four upright frame sticks, taking a single turn about each upright thread in passing.

Now and then the archæologist finds an impression on pottery showing the same type of weaving. It is not widely diffused, and must have been limited in its application on account of the slipping of the warp on the weft.

A more widely dispersed style of net is the running loop, or simplest form of crochet. It is a continuous spiral hooked into itself from round to round, and is an exceedingly varied and pretty stitch in the hands of aboriginal women in both continents. The Pima Indian

* Brigham, Cat. Bishop Mus., Honolulu, 1892, p. 23.

women of California construct their burden baskets of such network, and, by omitting stitches regularly or taking turns about the coiled part, give to the surface the appearance of lacework.*

But in the true net the cord is knotted at the intersections of the meshes, which are kept at a uniform size by what is called in museums a spacer. The natives of New Guinea, and, indeed, aborigines in other lands, were perfectly familiar with our square knot or reef knot, and the Ute Indians in the great interior basin of the United States employed the weaver's knot in making their carrying nets from the fibre of the native hemp. The very same type reappears in the netting of the ancient cliff dwellers, who had many resemblances in art with the Ute or Shoshonean tribes.

In Samoa it is the work of the women to make nets chiefly from the bark of the hibiscus. After the rough outer surface has been scraped off with a shell on a board, the remaining fibres are twisted with the palm of the hand across the bare thigh. As the good lady's cord lengthens, she fills her netting needle and works it into her net.†

We may pause long enough to note that the Samoans are also among the most skillful makers of tapa or bark cloth from the same material. The example of one of the Samoan women twisting, without the aid of a spindle, strips of this same bark into cord is as near to the invention of spinning as we may hope to come.

We have followed the savage woman through the manipulations of the textile art, and shown that up to the introduction of machinery it was her own. There

* Both styles figured in the Rep. U. S. N. Museum, 1887, pp. 264, 265, Figs. 7-9.

† Turner, Samoa, London, 1884, p. 167.

are certain decorations of textile consisting of overlaying, omitting, variation of stitch and colour, which will be more properly described in a chapter on her share in the origin of æsthetic products and processes. This art remains yet peculiarly the property of those who originated it, a fact that should not be overlooked by those who seek the good of women.