From Oriental Rug Review, Vol. 8/3, February/March, 1988

THE IMPORTANCE OF WOOL

by Stanley Bulbach, Ph.D.

Why do we respond so positively to older oriental carpets, but less so to new ones? Is it their designs or colors, or their history? Is it the romance of the exotic, or all of these factors together?

Why is it so often the case that when these same elements are combined today in a newly made carpet, even from the same sites, the resultant work seems merely to be a parody of the original treasures?

There have been slight changes in some of the designs reproduced, and the spontaneity of the modern weaver is often now suppressed. The loss of natural dyeing has denied most modern weaving a luscious palette of colors, as well as the animation of abrash. But these alone cannot account for the striking qualities of antique carpets as compared with the modern descendants.

A major reason for the difference is the wool. Most newer work uses wool that is duller than that used in most older work, which characteristically used long lustrous wools of large fiber diameter. This significant difference raises the importance of being aware that there exists a wide range of wools with a variety of qualities.

Wools vary Greatly in Many Ways

The spectrum of physical qualities of different wools is quite vast. Some wools grow only an inch or two a year; some can grow well over a foot or more. The thickest wool fibers can have twice the fiber diameter of the thinnest ones. The "crimp" can range from many waves per inch to a few waves per foot. Similar appearing wools can have quite different softness or harshness. This "hand" or "handle" is sometimes perceived as the presence or absence of scratchiness.

Some wools contain hair, a related protein fiber which has a structure different from wool. Wools come in many different colors although, until recently, colored wool-bearing sheep in the United States were usually slaughtered to cull out genes that could discolor the white wool crop. A very important wool variable is luster. Some wools are dull, some glow like silk, and some shine like mohair. Mohair is not a wool but a hair from Angora goats.

These variations occur in different combinations in over 200 different breeds of sheep. To complicate matters, the wool on each sheep is different from one part of the body to another. Wools also differ among individual sheep of the

Ill. 1. Photo by Brian Gulick Courtesy of Threads Magazine. *The longest, strongest, and most luxurious of modern wools is from the Lincoln breed of sheep. Most frequently Lincoln sheep are white, but a concerted effort is underway to increase silver and black animals.*

Ill. 2. *Photo by Leonard Guercio. Copyright 1988 Stanley Bulbach.* Messengers: *A "Flying Carpet" woven of lustrous Lincoln long wools, with a design of footprints inspired by Pre-Columbian burial cloths.*

same breed, between sexes, and from year to year depending upon variables such as age, health, and nutrition. Differences also occur depending upon the quality of care given to the fleece prior to shearing, as well as afterwards during the cleaning and processing of the wool.

These wools can range not only from good to bad but also from appropriate to inappropriate. After all, who wants to wear a sweater of perfect rug wool, which would be harsh and scratchy, or buy a carpet of luxurious sweater wool which is soft and not durable. But the latter is exactly what is happening with many types of new oriental rugs.

The Reason for Wool Discrimination

This last point merits considerable emphasis. The differences of wool qualities have enormous significance. We are all familiar with the importance of such similar variations among the different woods used for building, for furniture etc. All the craftsmanship in the world cannot make a soft wood function where a hard wood is required. This is commonly acknowledged, so much so that we expect to have access to wood species information when buying lumber or furniture, when viewing labels in furniture exhibitions or museums, and when reading professional publications on wood products and manufacture.

Yet, surprisingly, we are unfamiliar with the equally significant variations among wool fibers. This is particularly the case in the United States.

As far as wool discrimination is concerned, Americans seem to be aware only of "virgin wool" and "lamb's wool," although most could not define accurately what exactly those are. For example, "virgin wool" is wool which has not been spun or woven previously; it comes directly from the fleece of a live sheep, or it is "fell" or "pulled" wool off a dead animal. "Lamb's wool" is wool from sheep up to seven months old and is the first shearing. In the past couple of years, the market has also increased awareness of "Merino," but again few people know that it refers to a specific breed characterized by very short, very thin or "fine" wool best used for clothing. The term fine or medium or coarse wool refers to the diameter or thickness of the fiber and is a measure term, not a qualitative term.

This lack of awareness is the result of industrialization and affects the entire world to some extent. In America, much of our wool crop comes from Suffolk sheep, whose wool is average in quality and characteristics. The breed is very economical because it is an all purpose animal also with average meat quality. To the extent that the U.S. wool crop consists of different breeds, the wools are graded according to characteristics but are divided into rather large categories.

This wool then has to be processed to homogenize its characteristics so that it can be machine-spun into an even yarn. By this point it makes little sense to ask from which exact breed of sheep the wool comes. In this way modern reality has divorced us from traditional wool breeds. And in the American consciousness, wool is somewhat like our infamous U. S. beer -- it all seems to come from the same vat. This presents a major challenge to the modern wool industry as well as to carpet buyers.

Traditional Knowledge of Wool

Prior to the mass industrial production of wool, discrimination of wool grades and qualities was vitally important. Wool had been a principal force in the economy of Western civilization providing basic essentials but also providing capital and luxury goods.

In ancient Mesopotamia, woolen production was second only to food production. The wool crop was exceedingly large, and the early cultures developed skills in organizing workers so that yarn and textile production exceeded the needs of the domestic market. Excess inventory was traded outward, fueling commerce and internationalism. It helped spawn writing and other business skills. Sumerian economic texts found in Ur III dating from about 1,900 B.C. detail an annual production of about 2,000 tons of new wool for processing! The texts itemize different wool qualities for differing products, and differing grades of products always command different prices.

The importance of wools is detailed throughout the literature of the ancient Near East. The Bible details information of flocks and garments, such as Joseph's coat and Jesus' robe. The Assyrian Annals detail wools seized as tribute along with gold and silver. Classical literature records the important role of wool in the Greek and Roman Mediterranean world. It was big business and good business when priced upon the best use of the various types and grades.

This business fueled much of the economy in Renaissance Italy, as well as the later rise of England. There, ironically, it set off the Industrial Revolution but then fell victim to it.

The mass production of modern times not only reduced wool to a low common denominator for processing, but the mass marketing aimed to lower prices to increase sales. This meant less demand for select wools of higher prices, so luxury wools became unfamiliar. Knowledge of wool varieties declined further as the popularity of cotton rose. Later, wool became even less familiar in the American market as synthetics were marketed ever more aggressively.

Products of inappropriate Wools

The loss of speciality breed wools and the selection of inappropriate wools has lead to products with problems in recent decades.

When the U.S. Government "pacified" the Navajo people more than a century ago, the government brought in Merino and Rambouillet stock, that is, "fine" wool sheep with better meat characteristics. These "fine" wools are not strong; worse, they are hard to clean and card for spinning, can shrink greatly, are not lustrous, and they felt and mat easily. At the turn of the century, as Navajo weaving was developed less for blankets and more for the floor, the need for wools similar to their original mixed breed increased. The carpets of hand spun "fine" wools produced comparatively dull weavings that wore prematurely as carpets.

Another ethnic example noted by collectors is that of Moroccan weaving. In an effort to encourage the preservation of the weaving crafts, state and private projects have been providing weavers with industrially produced yarns to spare weavers the time and effort of spinning by hand their own yarns from their own local wools, which are strong and lustrous, particularly when they are processed gently specifically for the end project in mind. The new work using "fine" wool now looks counterfeit and dead. It wears poorly.

An example of this problem in the mass production of certain modern carpets is now notable. China is manufacturing carpets, reproductions of their earlier one which had used strong, lustrous "long wools," similar to wools used in Tibetan carpets. But the new factory products use "fine" wools, including Merino imported from Australia. When new, the carpet's pile is luxuriously soft. Unfortunately, the short fibers disengage too readily and shed. The fibers which do remain are entirely too weak to sufficiently withstand prolonged abrasion.

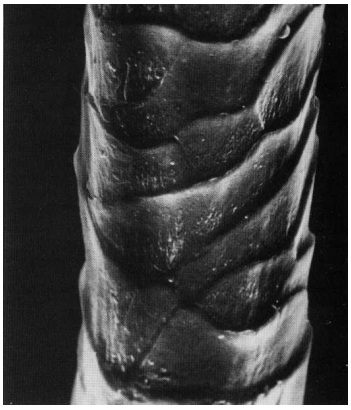
The manufacturers forgot that long fibers tend to stay engaged in pile yarns where short fibers disengage easily, and that Merino fibers are barely half the diameter, twice as fine as traditional carpet wool fibers. It is very important to note that when a fiber's diameter is doubled, the area of its cross section is quadrupled. Thus, using a fiber twice as thick will provide about four times the abrasion resistance!

Today's buyers, left to believe that all wools are the same are usually surprised to learn the hard way that wool differences do exist and are crucially important. Most rugs sold in the U.S. today are from China, Pakistan, and India, which use significant quantities of Merino wool, which is not long staple or high luster. Although soft to touch, it does not have the necessary durability because of its fine diameter and short staple.

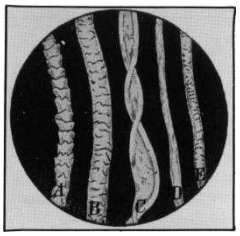
This contemporary lack of wool discrimination has hurt one related field seriously. In contemporary fiber art, attention has not been paid to wool variations. Even the America Craft Museum does not officially acknowledge these distinctions either in their exhibitions or their publications. In recent decades fiber art has focused on textured wools. Unfortunately, their original attractiveness has been overshadowed by their unexpected tendency to felt from atmospheric variations, to sag irremediably, to collect dirt, and to deteriorate. Most are nearly impossible to clean. However good the wools may be, they are inappropriate for the rigors of public art. Yet historical tapestries -- Coptic, pre-Columbian, Flemish, Italian and rugs from Middle Eastern countries which were made of longer, lustrous wools last for centuries and are capable of being cleaned when necessary.

The Importance of Lustrous Longwools
for Carpets and Tapestries

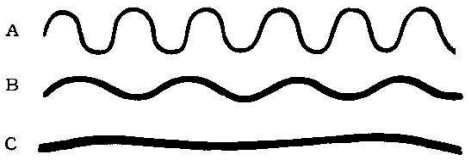
When we check, we find that most of the oriental carpets that are so beautiful are woven of yarns spun from highly lustrous, large diameter, wavy wools. While these wools can have a gentle "hand," they are very strong. These carpets seem to glow and actually show off the dye colors to great advantage. This is due to the larger scales that cover their larger fiber shafts.



Ill. 3. Courtesy of The Wool Bureau, Inc. Microscopic view of wool fiber surface. The reflective plaques are visible. This fiber is of "fine" Merino showing pronounced scales needed for felting. Lincoln fibers have few and less pronounced scales and in some magnification twice as thick.



Ill. 4. From Mathews, p. 13, Figure 5. Various Fibres A. Chinese wool, B. Merino wool, C. cotton, D. silk, E. Mohair.



Ill. 5. From Hart, p. 16, Figure 5. Contrast between Crimp and Waviness. A - XX Wool; B - 1/4 Blood Wool; C - Mohair.

Carpets of these fibers last longer, and so more of them come down to us. As the fibers have greater resilience, the pile, the weave, and the design all have greater integrity and definition; there is no matting.

Appropriate wool quality is the major reason why the historical pieces remain such attractive treasures and why they have endured. Good quality carpets are ever rarer, as the economic trends, particularly since October, 1987 are causing collectibles and antiques to soar in price. Such significant investments merit the ability to make skilled inspections of weaving and the materials woven.

In addition, a studied sensitivity to wools and their quality enhances our aesthetic appreciation of these arts, their geography, and their history. It also introduces us to the vibrant new projects in America of breeding and developing new high quality wools equal to those used long ago in the best ethnic weaving traditions, for example, redevelopment of the original Navajo churro sheep with their strong "luster wools."

There is a growing large international network of contemporary spinners and weavers. The reappearance of the ancient arts, materials, and techniques are now being recognized as a modern expressive art. Thus, by expanding attention to the variations of wool qualities, oriental carpet lovers can come full circle. We can admire and collect historical pieces more knowledgeably, and we can also explore and enjoy contemporary work now returning to the treasured ancient traditions and materials to create exciting modern textile art of equal fascination.

Editor George O'Bannon:

In this article on carpets and the importance of the use of long staple, high luster wools, Stanley Bulbach refers to several technical aspects of wool grading and classification which may be new to some readers. We have in our library several volumes on sheep breeds and wool. We thought it might be interesting to quote from two of these, Wool, by Stanley H. Hart (1917) and The Textile Fibres by J. Merritt Matthews (1904). Two old texts were chosen to merely to emphasize Bulbach's point that this is not recent knowledge but knowledge which has forgotten, at least in the contemporary oriental rug world.

Mathews, page 5:
The woolly, hair-like covering of the sheep forms the most important and the most typical of the textile fibre which are obtained from the skin tissues of different beasts . . . those properties which make the most suitable textile fibre . . .

(a) Sufficient length, strength, and elasticity, together with certain surface cohesion, to enable several fibres to be twisted or spun together so as to form a coherent and continuous thread or yarn; (b) the power of absorbing coloring matters from solution and becoming dyed thereby, and also the property of becoming decolorized or bleached when treated with suitable chemical agents; (c) in addition to these qualities, which they have in common with almost any textile fibre, wool fibres also possess the quality of becoming felted or matted together, due to the peculiar physical character of their surfaces . . . .

The texture, length, and softness also differ considerably in different portions of the fleece . . .
(1) The shoulders and sides of the fleece give the finest and most even staples of fibre.
(2) The lower part of the back yields a fibre of fairly good staple.
(3) The loin and back give a shorter staple, and the fibre is not as strong.
(4) The upper part of the legs give a staple of moderate length.
(5) The upper part of the neck gives a rather irregular staple which is also very frequently filled with burrs.
(6) The centre of the back gives a fine delicate staple similar to that from the loins.
(7) The belly, together with the wool from the fore and hind legs, yields a poor staple and a weak fibre.
(8) The tail gives a short, coarse, and lustrous fibre...
(9) The head, chest, and shins give a short, stiff, and straight fibre, opaque and dead white in color.

The microscopic appearance of wool is sufficiently characteristic to distinguish it from all other fibres. Under even moderately low power of magnification the scales on the surface of the fibre can be readily discerned, while neither silk nor the vegetable fibres present this appearance.

The exact nature and structure and arrangement of the scales differ considerably with different varieties of wool. In fine merino wools, for instance, the individual scales are in the form of cylindrical cusps, one somewhat overlapping the other; . . . In some varieties of wool, on the other hand, two or more scales occur in the circumference of the fibre, e.g. long staple wools.

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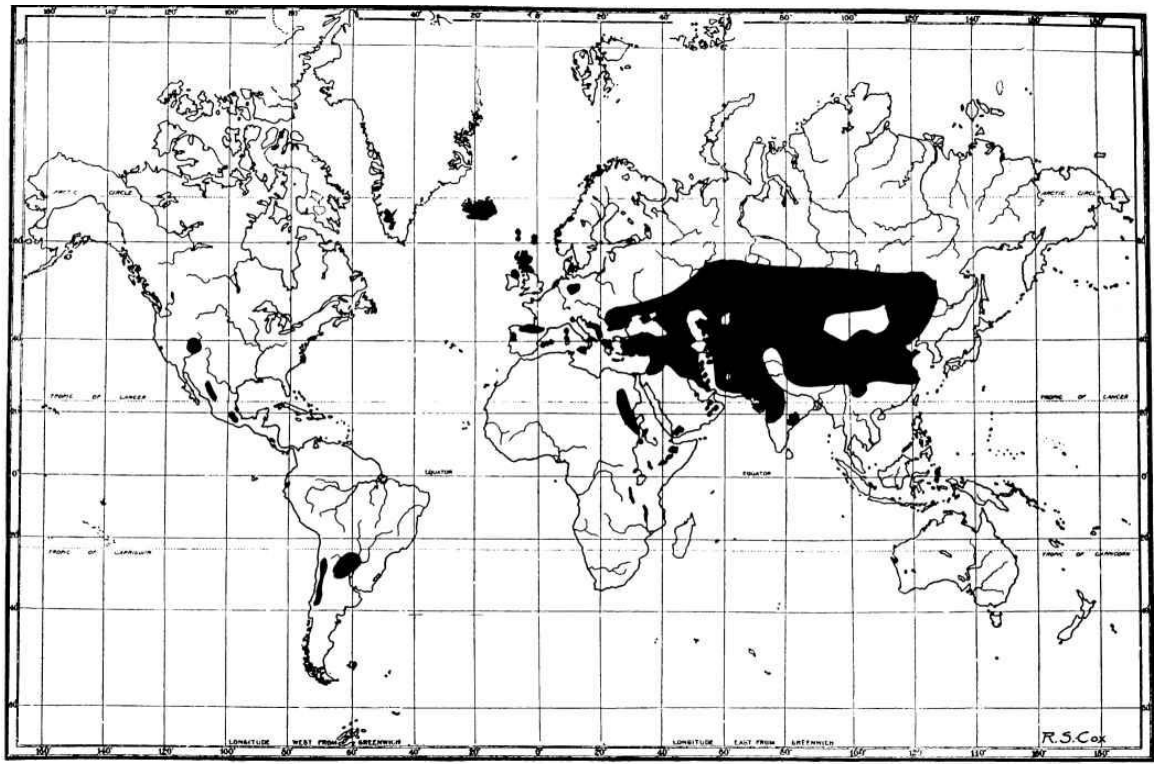
With respect to the variation in fibres derived from different kinds of sheep, Bowman gives the following classification:



Ill. 6. From Hart, p. 61, Figure 30. Map of World Showing Source of Carpet Wools.

(1) Those sheep the fibres of whose wool most nearly approach to a true hair, the epidermal scales being most horny and attached most firmly to the cortical structure. This class includes all the lustrous varieties of wool, besides alpaca and mohair. (Ed: e.g. carpet wools)

(2) Those where the epidermal scales, though more numerous than in the first class, are less horny in structure and less adherent to the cortical substance of the fibre. This class includes most of the middle wooled sheep and half-breeds.

(3) Those where the characteristics of true wool are most highly developed, such as suppleness of fibre and fineness of texture, the epidermal scales being attached to the cortical substance through the smallest part of their length. This class includes all the finest grades of sheep, such as the merino and crosses with it. (Ed: e.g. clothing wool)

Hart, Page 15
Waviness and Crimp. This condition is caused by the uneven growth and arrangement of the cortical cells, which cause the fiber to contract and bend. Waviness is more pronounced and called crimp in fine wools. It is usually totally absent in coarse wool fibres, and if present, the waves are long and irregular. The nearer the wool fiber approaches the structure of ordinary hair the waves become infrequent and irregular. It should be remembered that this waviness or crimp is valuable in spinning, and increases the elasticity of the yarn and fabric if present to any considerable extent.

Page 20:
Classification. Practically all fleece wools can be classified into one of the four following divisions: 1 - Merino, 2 - British, 3 - Crossbreeds, 4- Carpet Wools.

There are about two hundred different breeds of sheep in the world, but their fleeces can all be classified under the four divisions given above. The breed of the sheep influences the character of the wool grown on it, and governs to a large extent the length and diameter of the fibres, and also the other points to be considered, such as strength, elasticity, shrinkage, color, luster and waviness.

Page 60:
Carpet Wools. As the name indicates, these wools are principally used in the manufacture of carpets and rugs. They are mostly produced in Asia and Southeastern Europe by unimproved native sheep, most of which are the fat-tailed sheep which are valued more for the oil and fat obtained from the carcass than the wool grown . . . The great bulk of these wools are produced in Asia, Russia and Asia Minor, although practically all parts of the world contribute a limited amount.