

FAVORITE FIBERS OF HANDSPINNERS

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There are many different types of fiber to tantalize the fingertips as you work them. A brief description of some of these fibers is listed below:

ALPACA – Alpaca is one of three species of llama and a relative of the camel. These animals are native to South America, where they were domesticated in the upper reaches of the Andes mountains for their long, silky-soft hair. Today, alpaca is usually found in natural colors of off white, gray, fawn, and reddish, light and dark browns, and 99% of the world's alpaca population is found in Bolivia, Chile and Peru. There are two varieties of alpaca: "suri" and "huacaya." Suri alpacas are delicate animals with long locks of hair that hang almost to the ground. Their hair is thinner and has a higher oil content than the huacayas, which are strong animals with shorter, spongier hair.

Llamas evolved in South America almost 2 million years ago, and archaeozoological evidence states that both llamas and alpacas were domesticated approximately 6,000-7,000 years ago in the high Andes mountains. By 3,800 years ago their coats had developed into two distinct fiber types as they trickled down the mountains into Chile, and reached coastal cities between 400 and 100 BCE. The Incas used Alpacas from everything as a source for fiber to central parts of their religious ceremonies. The invading Spanish Conquistadors failed to utilize alpacas for their fiber, preferring the merino wool of their homeland, so alpaca fiber was virtually unknown outside of South America until the mid 1800s. Sir Titus Salt of London, England re-discovered alpaca, noting that it was stronger than wool despite the fineness of the staple tested. The alpaca textiles produced by his mills began making their mark across Europe and remained a common fabric in the apparel industry, but declined in popularity during WWII. Today, it is popular in the US with handspinnners and weavers, but its main markets are in Japan and Western Europe.

ANGORA – Angora can refer to one of two fibers: hair from angora rabbits or wool from angora goats (see MOHAIR). Angora rabbits, commonly bred in the US and Britain, yield a soft, fine fur from three to five inches in length that is harvested by clipping, brushing or plucking annually. As the hairs of angora are so fine, they are often blended with other fibers, usually with wool or cotton.

There are four main breeds of Angora rabbit: English, French, Satin and Giant, all of which are utilized for fiber production. Angora rabbits are believed to have originated in Turkey, and were bred by the French nobility as pets as early as 1723. The rabbits were exported to the US and Canada in the late 1920s. English and French were the original breeds, with both Satin and Giant recognized as breeds in the 1980s.

CAMEL – Camel hair usually refers to the downy undercoat shed by camels, although a blend of undercoat and guard hairs are also available for spinning. There are two types of camels – the dromedary (one-humped) camel of the Arabian deserts and the bactrian (two-humped) camel of Asia. The hair was gathered as the camels shed their winter undercoats in the springtime by a person who followed behind the caravan, picking up the tufts of hair as they were shed. Because the fiber is so light yet has incredible insulation capacity, it is rather expensive in it's 100% pure state (down only, with no long guard hairs). The camel hair coats and sweaters of the 70s were not always 100% camel, but were often blended with wool, mohair, tussah silk or other fibers to keep costs down. Beware of low-priced camel fabric or fiber - if it's super soft and expensive and comes from a reputable dealer, you've probably got the pure hair. If it seems coarse or inexpensive, think twice before buying.

Both species of camels are well adapted to heat and dehydration loss through specialized biological processes involving water consumption, circulation, and extraction from ingested material. Dromedary camels were domesticated prior to 3000 BCE in the Arabian peninsula by the nomadic Semitic cultures.

During the Moslem conquests of Egypt in the 7th to 11th centuries CE they became an important domestic animal and were used for transporting goods, passengers, and even for racing. The bactrian camels were domesticated slightly later, around 2500 BCE. They were found in southern Russia by the 16th century BCE and western Siberia by the 10th century BCE. They were in use in China as early as 300 BCE as the original transportation for the silk route, but were later replaced by camels cross-bred between the two species for better endurance.

CASHMERE – Cashmere gets its name from the Kashmir region of northern India, in the foothills of the Himalayan mountains. Cashmere refers to the downy undercoat (not the guard hairs) produced by the wild alpine goat (*Capra hircus*) native to the high plateaus of India, Afghanistan, China, Mongolia and the mountainous regions of Iran where the altitude ranges from 12,000 to 15,000 ft. The best quality of the down, called pashmina, comes from animals living in the highest and coldest regions of the mountains. Once these goats were domesticated and bred for the quality and quantity of their fiber, the goats can produce anywhere from 3 ounces to almost 2 pounds of down a year. The down is either combed, plucked or shorn from the animal, and the coarse guard hairs are separated from the down by special machinery with a final going-over by hand, resulting in a staple length of fiber from one to three inches in length. Today, very little cashmere comes from Kashmir, India – China and Mongolia are the major producers today.

While most Europeans were still wearing clothing produced from furs and hides, natives of the Kashmir region spun and wove outer guard hairs into cloth for clothing, tents and carpets. The downy fibers were spun and woven into finely-patterned shawls that graced the shoulders of royalty and diplomatic guests, eventually making their way to adorning the Caesars of the Roman Empire. Each shawl was woven by hand from handspun yarns and took on the average of two to three years to produce, thus commanding a staggering price not only for the handwork required to complete the shawl, but for the cost of the fiber itself. The cashmere shawls did not make their arrival in the European fashion community until the mid-sixteenth century, when the East India Company imported the shawls that soon became the must-have item for every “woman of quality” for the next hundred years. The introduction of these shawls revolutionized the European textile industry, as companies strove to find substitute fibers and means of production to rival these exotic shawls without the exotic price. The British textile industry could not find a substitute wool with the strength and fineness to substitute for true cashmere, and when they imported the raw fiber itself, their machinery could not handle the fine, lofty fiber. The closest imitation was created by a mill in France where cashmere fibers were wrapped around a fine silk core, but the resultant fabric neither felt nor draped like the original.

Several attempts were made to import cashmere goats into Europe at the start of the nineteenth century, almost all with disastrous results. On one attempt to introduce the goats, only four males out of 50 females and 50 males survived the journey. Through great trial and error, it was discovered that climate and altitude were essential factors in the livelihood of the breed. Today, cashmere goats can be found in the upper mountainous regions of Europe and Asia, and occasionally in North America.

Today, cashmere comes naturally in shades of brown, grey, black or white, with white being the rarest color. Different qualities of the fiber are available to handspinners. The highest quality cashmere will be free of any guard hairs, have no luster and will feel slippery like silk without any lumps or tangles. Because cashmere is such a fine fiber, it produces an incredibly soft fabric – but at great cost. Cashmere measures just 12-18 micrometers in diameter, thus making cashmere one of the world’s most desirable wools, fetching a wholesale price of around \$70 a pound for the raw fiber. By comparison, the softest alpaca fiber measures an average of 22-26 micrometers in diameter and costs only \$9 a pound for unprocessed fiber. The best quality down requires almost no processing – it just needs to be fluffed or shaken out and held lightly during the spinning process. There will be shrinkage in the final product depending upon the amount of twist put into the yarn.

COTTON – Cotton is the seed fiber of the cotton plant (*Gossypium sp.*), that grows in warm, humid climates with 3-5” or annual rain. The plants grow to flower in 80-100 days, then take an additional 55-80 days for the seeds to form and the cotton boll to open. Cotton is usually divided into three grades based on the length of the cotton fibers, which determine the quality: extra-long fibers (longer than 1 3/8 inches), that are usually finer and more lustrous like Egyptian and Sea Island cotton; long (1 ¼ inches) varieties like Pima cotton; medium-length staples (up to 1 inch) like Upland and Acala cottons produced in America; and short fibers that usually are Asian varieties. There are also several different colored breeds of cotton including a variety of green and brown shades.

Cotton was grown in the Indus Valley as early as 3000 BCE, and was known in Egypt in the 3rd Century BCE. The first mention of cotton on Western European history comes from the Greek historian Herodotus, who mentions the tiny “lambs” on the plants of India that produce cotton, a misconception survived into the 14th century. In fact the German name for cotton “baumwoole” translates into “tree-wool.” Cotton awnings appeared in Rome in 63 BCE, but was not grown in Europe until 150 CE when the Greeks began to cultivate it at Ellis. Arab traders brought cotton as far as Spain, and Spain and Sicily became major cotton centers by the 10th century. Cotton was considered a luxury fabric in Europe as it was imported and usually dyed or painted before it was shipped. Cotton was also valued because of the brightness and colorfastness of the dyes used to color it, and also for its use in making candle wicks. Prior to the Industrial Revolution, all cotton fabric made in Europe was woven with linen warps as people felt cotton was not strong enough for warp threads.

Cotton comes in a variety of forms for spinning and dyeing:

BOLL – cotton right off the plant with seeds still attached.

LINT – cotton that has been removed from the boll and ginned to break up and remove the seeds.

SLIVER – cotton that has been combed into top for spinning.

CARDED ROVING – cotton that has been carded into roving.

PUNI – cotton that has been carded on hand cards and rolled off into tight rolags, ready to spin.

LAMBSWOOL – Lambswool should refer to the first “virgin” shearing of a lamb, which is usually done around 7 months of age. This is usually the softest wool the sheep will ever produce. Sometimes the lamb is sheared twice in its’ first year and again when it is a year and a half – these second and third shearings are often passed off as lambswool as well. For more information on this fiber, see WOOL.

LINEN – Linen is the product of the bast fibers of the flax plant, (*Linum usitatissimum*) that run the length of the stem of the plant. The plant stems must be “retted” in water to allow the gum that adheres the fibers together to be freed from the rest of the woody stem material, then the brittle straw can be broken and cleared away in a process called “breaking and scutching”. Once the woody material has been stripped from the fibers, the fibers must be “hackled” or combed, to remove any remaining small pieces of woody material, align the long fibers, and separate out any short fibers. The long fibers that remain are called “line” and are usually sold in a “strick” (bundle of fibers) and usually need to be dressed on a distaff to hold the fibers while spinning. The shorter fibers removed by hackling, which are still spinnable, are called “tow.” Both line and tow can be wetted and smoothed between the fingers when spun so as to loosen the gummy matter that binds the overlapping cells of flax and cement them together, making for a smoother, stronger yarn. Compared with other fibers, linen has little degree of elasticity and extremely long fibers, which can make it challenging to spin. Once woven into cloth it does resist bending, making it prone to wrinkling and creasing. On the other hand, linen is a fairly strong and wear-resistant fiber - it gets 20% stronger when it is wet. It is also an excellent conductor of heat and thus keeps the wearer cool in hot weather.

Fragments of flax in stages from seeds and straw to fabrics have been found in the remains of Swiss lake dwellings dating from 8000 BCE. Very fine fabrics with threadcounts nearing 500 wpi made from linen (or shenu in Egyptian) have been discovered in Egyptian tombs dating back to the 7th century BCE, and tomb paintings dating back to 1900 BCE depict people separating, preparing, and spinning flax fibers. Phoenician traders brought linen to France, Belgium and Britain from the Mediterranean. Romans

discovered flax fields and linen cloth when they invaded those lands in 57 BCE, and quickly introduced flax cultivation throughout their empire. Flanders became one of the largest centers of linen production in the 16th century, and flax was spun along with hemp in households to produce cloth in Europe, Russia and Scandinavia until the Industrial revolution. In the 17th century other large production centers sprang up in England, Ireland, Scotland and the Netherlands, where some of the best flax fibers still come from to this day.

Flax is usually sold for spinning in two forms:

LINE – the longest fibers from the flax plant, separated by a process known as hackling. These fibers can reach upwards of 2-3 feet in length, and usually need to be spun from a distaff to keep them from clumping. It is often sold in a long twisted package, known as strick.

TOW – the shorter bast fibers separated from the strick by hackling. They usually produce a coarser, harrier yarn than spinning line. Spinning these fibers while frequently wetting your hands in water so you can wet the yarn as you spin it will reduce the hairy tendencies

LLAMA - Llamas (pronounced "yamas") is a relative of the alpaca and vicuna, and is native to the South American Andes region that includes Peru, Bolivia, Argentina, Ecuador, Columbia and Argentina. They were first domesticated by the Incas, being a source for food, fiber, fuel and transportation. Whereas alpacas were bred for their fiber, llamas were bred specifically for strength and size as they made excellent pack-animals, allowing the Incas to cover the long distances and diverse altitudes in the region. They were also held in high regard as icons in spiritual and fertility rites, as they were so versatile in providing many products to the people that raised them. In the 1500s this reverence came to a screeching halt with the Spanish Conquest, as the invaders either displaced or destroyed these animals in favor of their own domestic animals, namely sheep. The Vicuna and Guanaco were hunted to the brink of extinction for their pelts, and the llamas and alpacas were left to eke out a meager living as livestock of the poor in the harsher climates in the area.

When the international textile scene re-discovered the fineness of alpaca thanks to Sit Titus Salt of London, England, the Andean countries began to focus the management, selective breeding and research practices normally reserved for sheep on the alpaca. As llama wool was considered inferior, native attention was not focused onto the llama until the early 70s when the popularity of the animal was on the rise in the United States. Llamas had been imported as exotic species in the US in the early 1900s, but were mainly considered specimens in private collections or zoos until they were recognized for their pack animal and companion/pet qualities. By the late 70s demand far outstripped supply, and import restrictions in place since the 1930s for fear of foot and mouth disease from South American animals was lifted. Since then, the llama population in the US has risen steadily to over 100,000 animals that are used for a variety of purposes, the least of being it's soft and durable fiber.

MOHAIR – Mohair from the angora goat is a long and shiny hair that is often used to make hair for dolls and bards for Santa Claus costumes. Angora usually has a staple length of four to 12 inches, and is light and fluffy to the touch. It is also extremely durable when spun and woven tightly, and is remarkable crease-resistant. It is often found in "fuzzy" bright colored garments, as it has a wonderful affinity to take dyes.

The angora is said to have originated in the mountains of Tibet, although they are named after Angora (today known as Ankara), the capital city of Turkey. The word mohair comes from the ancient Arabic "mukhaya," meaning "cloth of bright goat hair." Records dating back to the 11th century show mohair being used to create fabric for clothing among the Sumer people of Turkistan. In the 13th century when Genghis Kahn drove Suleyman Shah out of Turkoman lands, he and his family drove his flocks of angora goats each day towards the Euphrates river. Although he perished while trying to cross the river, his son Ertugul managed to reach the city of Konya and became a subject of Sultan Aladdin. The Sultan granted him with lands stretching from Ankara to Kayseri, so there the goats settled. In 1554 a pair of angora

goats were sent as a gift to the Holy Roman Emperor, and the demand for the fabulous fleece soon outstripped supply. The Sultan of Turkey was forced to put an embargo on the export of raw fleece, thus only allowing spun yarn to enter foreign markets. Queen Victoria finally put enough pressure on the Sultan to get the ban on raw Mohair lifted, but soaring demand caused many herders to cross-breed their flocks, thus diluting the purity of the species. In the late 1700s many attempts were made to export the goats to Sweden, Venice, Germany and England, but all attempts to introduce the goats failed until they reached South Africa in the 1830s. By 1856 South Africa became an important supplier of high quality Mohair, and remains to this day along with Turkey and the state of Texas.

SILK – Silk is a fiber produced by the silkworm (which is really a caterpillar) as it spins a cocoon around itself for protection during its evolutionary transformation from worm to moth. Although there are many insects that produce a fibrous cocoon, the only ones used in the silk industry are those produced by the cultivated mulberry silk moth, *Bombyx mori*. For six weeks, newly-hatched silkworms feed continuously on mulberry leaves – a newly-hatched silkworm will multiply its weight 10,000 times within one month. Once they have stored up enough energy to enter the pupae stage, they produce a jelly-like substance in their silk glands, which solidifies when it comes into contact with air - the cocoon is spun out of one continuous thread of silk from 600-900 meters long, taking anywhere from 4 to 8 days to complete. The amount of useable silk is extremely small – it takes roughly 550 silkworms to produce 1 kg (2.2 lbs.) of raw silk. (Microsoft Encarta, 1995.) After the cocoons have been gathered, they are boiled or treated in ovens to kill the worm inside by heat. The cocoons are heated in boiling water to dissolve the gummy substance that holds the filament in place so that the fibers can be loosened and spun.

Silk is one of the oldest known fibers used in textile production, and has been in use as far back as the 27th century BCE according to Chinese tradition. China carefully guarded the secret of the origin and processing of silk until emigrants to Korea, Japan, and later India, brought the secret with them in 200 BCE -300 CE. Prior to this time, anyone caught revealing the secrets or smuggling the silkworm eggs or cocoons out of China could be punished by death. It is theorized that all silk woven in Europe came from Asia until 552 CE, until two Nestorian monks on a mission to Asia returned to Byzantium with silkworm eggs and mulberry seeds hidden inside their bamboo walking sticks. The earliest silk was imported from China, and trickled across Persia and northern Europe as early as 400-600 BCE. A major silk-weaving centers formed in the Near East in the 3-4th centuries using silk imported from China to Persia along the Silk Road, the largest-scale silk trade route in the world, which started around 140 BCE. In the late Middle Ages, important silk manufacturing centers were set up in Spain, France and Italy. These manufacturing centers soon became the centers of dye technology, as silk was dyed using the highest quality dyes available.

There are several different varieties of silk:

NOIL – Noil is the silk from the innermost part of the silk cocoon, and can be purchased in lustrous, coiling segments.

SHANTUNG – Shantung silks are produced by wild silkworms, and often have irregular fibers that are great to use when spinning textured yarns.

TUSSAH – tussah silk can come in a variety of honey colors, which are determined by the amount of tannin in the leaves that the worms eat.

VICUNA – Vicuna is the hair from the wild member of the South American camel family, and a close relative to the alpaca. It is light cinnamon brown in color, and is extraordinary for its soft and lofty fibers. Vicuna is reported by many to be the softest, finest and most expensive natural fiber in the world, as well it should be – the animals must be killed to get their fur, and were hunted almost to the brink of extinction for their hair. Now that they are a protected species, the fiber is extremely rare and very expensive.

QUIVIOT – Quiviot is the fiber from the downy undercoat of the musk ox. Quiviot is very soft and warm. Quiviot is also quite expensive, selling upwards of \$10 & \$20 an ounce depending on the quality and how de-haired the fiber is. It is also often sold as a blend with either cashmere, merino or silk.

WOOL – Wool, a protein-based fiber produced by sheep, has been found in Europe dating back to 2000 BCE. Sheep were domesticated almost 8000 years ago. Wool garments were worn in Babylon as early as 4000 BCE, and clay tablets from 2500 BCE mention the Mesopotamians' and Sumerians' activities in trading wool with nearby peoples. In the second millennium BCE the nomadic horsemen of the Asian steppes wore wool pants and coats as they made their way into the Near East, and Phoenecian traders spread wool throughout the Mediterranean areas in the following centuries. The Romans bought wool with them as they spread to the British Isles and to Spain during the reign of Claudius, where selective breeding and an ideal climate produced the Merino breed, one of the softest varieties of wool in the world. Merino was so highly prized by the Spanish that anyone caught smuggling a merino sheep outside of the country would be put to death. In 1786 the Merino finally reached France, where Louis XVI began raising and interbreeding them on his Estate at Rambouillet, this establishing another fine, soft variety of wool.

Wool quickly became one of England's economic mainstays, and England and Spain were the two major competitors supplying wool to Europe. Edward III of England forbade the export of raw wool from England and the wearing of foreign-manufactured wool garments, and by 1600 CE two-thirds of England's foreign commerce was from wool textiles. With the demand for wool cloth growing rapidly, England began to branch out of country for new sources for raw wool. South Africa and Australia soon became major wool suppliers, with flocks (ironically) springing from a gift of six merino sheep to the government of the Netherlands from the King of Spain. It was a common medieval fabric in both dyed and natural colors, and was processed by both professional manufacturers and housewives. There are a tremendous variety of breeds of wool that can have different fiber textures and characteristics.

Wool comes in a variety of forms:

LOCK – wool right off the sheep that has not been combed or carded is considered to be in "lock" form. Sometimes it is raw from the sheep, full of dirt, grease (lanolin), vegetable matter, and other interesting things that sheep roll around in on the pastures and hillsides. This should be washed and picked out of the fiber in order to facilitate spinning, although wool can be spun "in the grease", or right off the sheep.

ROLAG – Brushing wool fibers back and forth on two hand cards will remove any shorter cuttings and debris, as well as untangle the fibers to make them easier for spinning. When the quantity of wool is removed from a hand card it is usually rolled off of the card from top to bottom, forming a rolag, which is then ready to spin.

ROVING – Roving is formed from the same basic process as carding, just on a machine that can produce a continuous rolag. These machines can card wool into roving that is ready to spin into woollen yarn.

TOP – After being carded, you can pass the fibers through a device called a pin carder that will align the fibers so that they are almost parallel with each other, allowing a spinner to spin a more worsted yarn.

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