

Silk Silk and More Silk Thread: A Primer

by Sabrina de la Bere

The more I played with silk thread for historical embroidery, the more I began to get curious about the history of silk, what was used for the historic embroideries, and the modern equivalents. And of course, part of playing with different silk threads is only an excuse to add to my “stash”.

Silk Basics

While there are a number of different types of silk moths, 2 are primarily used for the production of quality silk thread – the Bombyx Mori and the Tussah moth. The Bombyx has been successfully domesticated for about 5000 years in China and has lost its ability to fly. Their natural diet is mulberry leaves. The silk they produce is the finest white silk. A number of other types of moths have also been adapted to domestication and are now farmed (“sericulture”).

The Tussah moth comes from India and has not been domesticated. Its’ cocoons are collected from its natural environs of oaks where its’ primary diet is oak leaves. The tannin from its’ diet causes it to have a natural cast that ranges from light gold to dark brown and it is slightly less flexible than cultivated silk. Silk produced from the Tussah and other wild species is called “raw silk”.



Page 3 - Vermis Sericus - young women are instructed in caring for the cocoon - keeping them clean and warm

The silk moth spins a cocoon in its caterpillar state. It is the fiber that the caterpillar creates and forms into its cocoon

that is the basis for the silk thread. The threads it exudes are bound together with a glue called sericin. Each cocoon contains between 2000 and 3000 feet of silk thread. If allowed to mature, a caterpillar remains in the cocoon for 22-32 days and then emerges as a moth.

If the cocoon is allowed to mature and the moth emerges, it “chews” through the cocoon and leaves behind the broken fibers. These are then placed in warm water to release the sericin. The broken fibers are then spun into thread.

When farmed, the caterpillar is not allowed to mature and is killed while inside the cocoon. The cocoons are placed in warm water to release the sericin from the fibers (sugas). The fiber is then reeled off in a single filament. The sugas or filaments are then combined and resulting fiber may be twisted or folded to form thread. Fine untwisted silk thread is made from 4-6 sugas.

With early silk, the skeins were dyed. This process included the boiling off of the gum, the weighting of silk and the coloring. The weighting of the silk to add bulk to the thread was done with salt. Raw cocoons were also packed with salt for transport from China. There are warnings to western merchants about checking the salt content of early trade goods.

Silk and Its Terminology

- Boiling – the process of degumming silk threads or goods by boiling in soap and water.
- Bourette – a yarn; usually heavier weight with bits of extraneous materials occurring in it.
- Cordonnet – a “cord” made by taking several raw silk threads, doubling and loosely twisting them in one direction. Then 3 of these are joined and tightly twisted in the reverse direction.
- Denier – a French coin, used as a weight for determining the size of raw silk. Modernly .5 grams and then the number of these used to balance 450 meters is the “denierage” or size of the silk.
- Filament Silk – silk that comes from the cocoon in an unbroken thread; single fiber.
- Floss – a soft silk thread that is

practically without twist. Also refers to the loose waste silk emitted by the worm when it first begins to spin its cocoon.

- Noil – short, lumpy fibers that are left after the combing process of making spun silk.
- Ply – individual threads combined to form a thicker thread.
- Raw silk – refers to the silk produced from cocoons that are gathered versus cultivated; hence reeled silk. Also, the silk that is unprocessed is raw and is frequently followed by the term silk.
- Reeling.– the process of unwinding the silk from the cocoon.
- Sericulture – the farming of silk caterpillars into the final product of silk thread.
- Staple – silk thread spun from staple fibers; the broken fibers or waste fibers.
- Spun Silk – silk that comes from a cocoon that has matured and thus necessitates the spinning to form the bits into thread. May also contain the remainders of the outside layers of the cocoons that are used for filament silk, but that is deemed of poor quality or leavings from the floor of the silk workshops.
- Thread – general term for length of fiber.
- Throwing – the process of taking silk fiber and processing it into usable thread. Includes twisting and doubling and then twisting until the desired thickness is reached.
- Tinsel – thread made by flattening wire which is then twisted around a core, frequently silk. Modernly we refer to this as “Jap” or “Japan” gold.
- Twist – the process of taking multiple plies and twisting them, usually under tension, to create a thicker thread. One version is Buttonhole Twist.
- Winding – transferring the silk from skeins (the result of reeling) to bobbins.

Why Silk

When you look at a piece of embroidery with silk you see a wonderful luster and sheen. The colors appear to be deeper and more vital when compared to other fibers including the “synthetic silk”. This is what drew me to using silk. Then I fell in love with the feel.

How the luster and sheen happens has to do with the natural properties of silk. When it is high quality reeled silk it reflects light so well that it almost looks like it is the source of the light. This is due to the almost translucent outer cellular layer. It also has a special cellular construct that allows it to receive and hold dyes well. This gives it the deeper saturated color with the strong reflective quality.

Silk also has very high tensile strength. It is said that a single silk filament is stronger than an equivalent steel filament. This strength along with its imperviousness to mildew and bugs has resulted in some wonderfully preserved pieces of fabric and embroidery.

Depending on how the silk is processed, it can have a very smooth surface and is extremely flexible. When processed to maintain the native luster, it maintains a smooth and reflective surface. Hence the wonderful feel of silk threads. Even when the lowest quality of silk is spun and worked, it still has the suppleness and “silky” touch we associate only with silk.

Thumbnail History of Silk

Timeline for silk culture and fabric developments:

3000 BC – Chinese discover silk thread

2200 BC – Chinese trade silk with India

400 BC – China trades silk with India who in turn trade with the Persians who in turn trade with Rome and Greece - in Greece imported goods are unraveled and the silk threads re-woven

140 BC –silk worms smuggled to Khotan

27 BC –silk becomes common place in Rome for the elite and is used in trim bands on garments

1st C. – China develops silk velvet

200 – sericulture in Japan and Korea and shortly there after India

3rd C – sumptuary laws on silk wear and purchase in the Roman Empire as the cost was prohibitive being more



Page 4 - Vermis Sericus - instructions on the proper way to keep the worms warm and hasten its development. Some are woven onto “trees” and there remain until the sun sets.

than gold, pound for pound
 300-700 – Persia (Sassinid) and Byzantium dominate the silk trade and silk weaving
 400-600 – silk reeling, Chinese silk techniques and the Bombyx Mori brought to India
 5th C – Sassinads develop compound weft twill silks
 550 AD – sericulture in Byzantium spreads — to N. Africa and Spain and from Greece to Sicily and Italy — the spread and development continues with the Crusades and the unsettled times on the Italian peninsula and Sicily
 8th C – Chinese develop silk satin, but it does not come into heavy use in Europe until the 13th C.
 800 – Central Asian silks (Byzantine) used as dalmatic fragments in England
 8-9th C – silk woven in England, on drawlooms, with a weft faced compound twill known as “samite” that shows off long weft floats of the silk. There are also weft faced patterned tabby weave silks with geometric patterns. The drawloom may have been brought back by the Crusaders from Damascus.
 12th & 13th C. – increased usage of metal thread in woven silk cloths.
 1251 - silk manufactured (from imported cocoons) in England - noted in accounts of the wedding of Henry III's daughter where a thousand knights wear silk garments
 13th C. – Lucca becomes the major silk weaving export center in Europe for luxury cloth. 1349 silk weavers form their own Guild in Lucca. Silk production centers in Genoa, Venice, Bologna, and Lucca.
 1400's – silk velvet woven in Venice; including the development of the gold pique velvet — cross influences between painters, embroiderers and weavers in designs
 15th C – shot taffeta and sarsinet developed using reeled silk with little or no twist
 15th C – cotton velvets of Bursa (Ottoman) - usually cotton foundation with silk pile
 1500's – sea routes between Italy and India & China open - “silk road” begins its decline
 1546 – House of Tussah (weavers versus traders) opens in Lyon France
 1562 – Guild of silk throwers formed in Spitalfield, England
 1598 – Elizabeth I presented with machine knitted silk stockings

Timeline for embroidery with notes on some notable pieces:

6th C BC – Halstatt Barrows (on the Danube) - Chinese silk used for embroidery of Celtic patterns on woollen garments –silk probably courtesy of Greek traders. ** [Scott p. 78]

2nd - 1st C. BC – Chinese embroidery in silk - chain stitch, satin and plain line stitch
 1st C. AD – Chinese embroidery including stem, satin, chain, and long & short stitches
 1st C. – “jap” gold (thin metal strips around a silk core) are traded from China to Rome, primarily for weaving
 4th C – Chinese silk embroidery used for trade - chain stitch in blue, crimson, sand and brown primarily
 9th C – Anglo Saxon panel, now in Masseurik Belgium, worked in silk thread, couched gold and seed pearls. Design of arches, birds, animals, and monograms believed to be church furnishings. ** [Scott p. 194] Said to be one of the first silk embroidered pieces in Europe.
 10 - 11th C – Egyptian embroidery (Fatima period) of a peacock stitched in silver, gold and silks on linen (Abegg collection)
 late 11th C – Chinese embroidery in silk - needle loop stitching
 1133 – Palermo - Mantle of Roger II - red and gold silk embroidered and appliqued, and sewn with pearls and set gems. This embroidery is in an Islamic style and bears an Arabic inscription blessing the owner and identifying the city and year when produced.
 1166 – Almeria - embroidery on the Shroud of Lazarus & Chasuble of St. Thomas a Becket - colored silks and gold thread on a sky-blue silk; kufic inscriptions and roundels of animal and human figures. Example of workshop pieces from Spain with Central Asian influences.
 12th C – Persian Tiraz, embroidered bands, silk embroidery on cotton/silk fabric - worked in “crewel” and split stitch, with couched gold thread (gold wrapped silk thread). Some bands have kufic letters, animals and trees. Silk colors in-



Page 2 - Vermis Sericus - the beginning where the monastic order gives the right to produce silk unto the Florentine nobles. This is whence sericulture came.

clude blues, green and red.

13th C – Opus Anglicanum - English embroidery primarily done for the Church and nobility in embroidery workshops - primarily silk split stitch and couched (underside) gold thread. Examples: The Grandson Antepedium, The Copewitth he Tree of Jesse, etc.

13th C – rise of *weiberlisten* embroidery, another type of German embroidery. Meaning “wiles of women”, these embroideries drew from stories of classical antiquity and the Bible, and focused on “resourceful women thwarting powerful men” [Scott p. 195]. These embroideries were not from the workshops, but from the hands of the patrician and burgher class women and were based on woodcuts with the characters in contemporary dress. The embroidery is worked in silk, wool, and metal threads on linen and the stitches are primarily satin and split stitch.

13th C – silks completely covered with gold and silk embroidery are produced in Sicily and Southern Italy such as the 5 meter long drape for the funeral cart of Saint Francis (1226/1230).

1303 – Provost of Paris, Guillaume de Hangest, implements regulations requiring that anyone doing gold thread work, must sew with silk. Quality control regulations called “verleger” are implements through out Europe.

Late 14th C. – rows of running stitches in silk thread on fine wool [?] twill - decoration on everyday garments of other than noble classes. Also examples of silk used on buttonholes.

1600 – India, under the Moguls, cut and voided silk velvets with silver and gold embroideries are made as floor spreads and canopies. Quilted silks and cottons are embroidered in silk chain stitch for summer carpets, hangings, and screens.

“S”, “Z” & Filament Silk Embroidery Threads: A Series of Historical Examples

One early example of flat silk use is the Chasuble of Saints Harlindindis and Relindis from 850 AD where flat silk is used to couch gold and forsatin stitch in colors of red, blue, yellow and green.

In the Lan-gors panel (800’s) the silk embroidery is fine; having an equal number of thread as the ground linen - 25 threads per cm. The silk thread is reeled silk. Some of the silk has a slight “S” twist and is not plied and some has a slight “Z” twist that is from two threads that have been “S-plied”. The stitch is stem stitch - 3 over, 1 back.

In the 12th C liturgical sandal in Lyon, the gold embroidery was made of gold strips twisted in an “S” formation around a silk core. The gold is couched down and outlined with stem stitch or split stitch in red silk.

There are a number of examples of 14th C. buttonholes, done with a buttonhole stitch in the London archeological finds. The silk is a 2 ply - Z twisted, S-plied silk. This is also the type of thread that was primarily used for stitching whenever silk thread was used in these finds.

In Schuette there is mention of a Wespahlian cushion of the 14th-15th C that is embroidered with untwisted silk floss. The stitching is brick stitch. The colors of silk used are green, yellow, red and white.

In the Alter Frontal from Middelburg, circa 1518, the gold thread embroidery is laid two by two and couched in silk. In both the Or Nue technique and the laid and couched silk sections, the silk used has no twist. The metal threads have an S-twisted silk core.

In Bursa and other Turkish silk centers, the most highly prized silk was the tightly spun. This was earmarked for the weavers and the unspun or less twisted was set aside for the embroiderers. Most of the Ottoman embroidered textiles were done with a 2 ply silk thread. Krody notes that “Both Z- and S- plied threads were sometimes used on the same textile.” She further notes that sometimes unspun, 2 plied silks, and loose and highly plied silks were used together to give dimension to the embroidery. [Krody p. 38] The metal wrapped threads are predominately z twisted, although there are some examples of S twisted metal threads in Ottoman embroidery. The color of the silk core was chosen to enhance the intended effect of the metal.



Page 5 - *Vermis Sericus* - the orderly progression toward the final step where the leaves are gathered and spread over the pupa.



Italian Filiculture 1500 - from The Story of Silk also the last page of Vermis Sericus depicting the reeling of silk.

In the mid-1500's there are regulations in Italy regarding the importation of "thin" and "thick" silk. This refers to the diameter of the size of the thread when reeled. The "thin" silk was costlier and preferred for making fine garments. The different sized threads also meant different workmanship, different fabric types, and greater differentiation between the silk producers and producing areas. In addition, sometimes the threads imported from different areas were combined in the production of both cloth and threads to achieve various effects.

Modern 100% Silk Embroidery Threads

The following information comes primarily from the manufacturers' websites or information cards attached to actual skeins. Included are only 100% silk fibers. Some of them, while not immediately usable for embroidery, form the basis for many of the current "specialty" silk embroidery threads and could be spun or dyed by the embroiderer just as period silks were frequently obtained from the local weavers guild.

Alyce Schroth – Embroidery Floss - 2 ply fine, single strand, low-luster, 100% silk, hand-dyed with natural dyes.

Alyce Schroth – Needlepoint Floss - 2 ply heavy, single strand, low-luster, 100% silk, hand-dyed with natural dyes.

Au Ver a Soie – Soie Chenille a Broder - plush velvety thread.

Au Ver a Soie – Soie d' Alger - 7 strand spun silk, soft finish.

Au Ver a Soie – Soie 100/3 - fine spun silk, finer than Soie Perlee; good for fine blackwork, raised stitches, and good for couching and 130/2 for lace.

Au Ver a Soie – Soie de Paris - 6 ply filament silk, divisible.

Au Ver a Soie – Soie Gobelins - finer than perlee and being discontinued.

Au Ver a Soie – Soie Perlee - a twisted 3 ply filament silk, very shiny, similar in thickness as 8 pearl.

Au Ver a Soie – Soie Platte - flat untwisted silk with a shiny finish. — Note this product is now marketed as Soie Ovale.

Caron – Soie Cristale - a twelve-ply solid color spun silk

from Italy.

Caron – Waterlilies - soie cristale base fiber, hand dyed variegated colors.

Ebony Thread Collection by Leon Conrad Designs – silk threads in 8 thicknesses for blackwork embroidery - set includes: #30 "Gossamer," #60 "Spider's Web," #130 "Lacewing," #210 "Ebony," #270 "Soft Granite," #330 "Charcola," #540 "Mystery," and #P12 "Egyptian Night".

Eterna – Mini Twist - filament silk with tight twist - 6 strand similar to cotton floss in use and coverage; also comes over-dyed.

Eterna – Stranded - nearly flat filament silk - 12 ply, 2 plys are slightly thicker than 1 strand of cotton floss, may also be divided down further for more delicate

work; also comes overdyed.

Eterna – Silk Twist - filament silk - single ply twisted comes in sizes 3,5, 8, and 12 similar in size to pearl; also comes overdyed.

Glissen Gloss Japanese Color wash Silk – hand painted Japanese silk, 12 ply.

Gloriana Threads – Luminescence - is a hand over-dyed silk twist (*Soie 100/3*) - a single strand buttonhole twist.

Gloriana Threads – silk floss - spun silk that is hand over-dyed and comes 12 strand; very soft hand.

Gloriana Threads – Princess Perle - 3 ply twisted hand over-dyed filament silk similar to size 5 pearl.

Gloriana Threads – Princess Perle Petite - over-dyed Kanagawa 1000 denier continuous filament silk thread tightly twisted silk similar to size 12 pearl; good for counted thread and surface embroidery.

Gutermann – Silk Thread – for hand or machine sewing and embroidery; good for sewing bullion.

JL Walsh – Embroidery Floss - 15 ply filament floss from Switzerland, hand-dyed, probably the finest silk embroidery floss commercially available.

JL Walsh – Buttonhole Twist - 3 ply tightly twisted silk from Switzerland, hand-dyed.

JL Walsh – 8 ply pearl - tightly twisted from Switzerland, hand-dyed.

Kinkame – Silk Thread - filament silk for hand or machine sewing and embroidery.

Kreinik – Ping Ling - discontinued shiny smooth 6 strand divisible silk; good for fine work.

Kreinik – Silk Bella – continuous filament – thin tight hard twist, 3 ply very fine with a bright sheen, good for detail work such as woven bars, blackwork, or outlines.

Kreinik – Silk Mori – spun from silk staple fibers – floss – 6 strands use as any cotton floss but a bit fluffier and very soft hand.

Kreinik – Soie Perlee (see Au Ver a Soie - Soie Perlee)

Kreinik – Silk Serica – continuous filament – use as is for "pearl" or ply down to 3 twists or dampen and press for multi-ply flat silk effect; good for laid work.



*Reeling Silk, Japan around 1900
From The Philadelphia Museum*

Madiera – Silk Floss - 4 strand, with a lot of loft.
 Needlepoint Silk – 8 ply spun Chinese silk.
 Pearsalls – Filoselle Silk/Pure Silk Thread - 6 strand continuous filaments of raw Bombyx Mori silk.
 Pearsalls – Twisted Embroidery Silks - continuous filaments of raw Bombyx Mori silk twisted.
 Piper – Spun Silk - 210/2
 Piper – Spun Silk - 140/2, comes in 2, 3 and 4 fold, equivalent to Crochet cotton 80 in size.
 Piper – Spun Silk - 130/3
 Piper – Spun Silk - 100/3, equivalent to Dentilles 80 and suitable for Torchon lace.
 Piper – Spun Silk - 80/3, equivalent in size to Cordonnet 70.
 Piper – Floss Silk 90 - high gloss, slight twist (a couple times per inch) and appear almost flat. May be folded.
 Piper – Floss Silk 90 Twisted - high gloss, twisted.
 Piper – Floss Silk 90 Folded - high gloss.
 Piper – Floss Silk 480 Twisted - high gloss.
 Piper – Fine Twisted Silk - comes in 2/20, 4/20, 6/20, and 95/3, fine silk.

Piper – Twisted Semi- Gloss Silk - comes in 180 and 300.
 Piper – Twisted Gloss Silk - comes in 90/2, 90/3
 Piper – Twisted Silk Gimp - comes in 80.3, 50.2, 34/2. 50/3. 43/3. 40/3, 30/3, 90/9, and 15/2.
 Rainbow Gallery – Elegance - tightly twisted similar in size to 8 pearl.
 Rainbow Gallery – Grandeur - tightly twisted similar in size to 5 pearl.
 Rainbow Gallery – Splendor - 12 ply silk floss (3 bundles of 4) with a tight twist.
 Rainbow Gallery – Subtlety - tightly twisted similar in size to 12 pearl; usable for pulled work.
 Texere – Throwster’s Waste - Long pure silk filament fibre with the gum still adhering. Wash off the gum and spin or leave flat. Suitable for home dyeing
 Texere – Tussah Silk Noil - Pure Tussah Silk with golden tint. Wild silk fibers suitable for home dyeing.
 Texere – Mulberry Silk Noil - Short white silk with traces of chrysalis for spinning and home dyeing.
 Texere – Dyed Tussah Silk - dyed Tussah silk noil; primarily for weaving at 10/1nm.
 Texere – Bourette Silk- dyed Mulberry silk noil spun into thread at 10/1nm and 15/1nm; primarily for weaving.
 Texere – Princess Silk - 4ply silk noil; primarily for knitting.

Texere – Chinese Extra Thick Silk - undyed 100% Bourette Silk with a “chunky thickness”; primarily suitable for knitting or weaving (17/16nm).

Texere – Chinese Silk - undyed pure Bourette Silk; suitable for weaving; comes single ply 17/1, 2 ply 17/2, and 4 ply 17/4 nm and in 2 thicknesses - single thickness (17/1nm) and 3ply thickness (17/3 nm).

Texere – Chinese NumberedSilk - undyed pure Bourette silk suitable for weaving; comes in2ply thickness (10/1nm), 3ply thickness(10/2nm), 4ply thickness (10/3nm) and double knitting thickness (10/4 nm).

Texere – SS 60 Pure Super Spun Silk - A pure super spun silk for use in carpets, embroidery, braids and tassels, knitwear and fine woven fabrics 60/2 nm.

Texere – SS 30 Pure Super Spun Silk - A pure super spun silk suitable for knitting or weaving ; comes 30/2, 16/2, 8/2, 5/2 and 2.5/2 nm.

Texere – Mulberry Silk Tops - degummed and combed smooth silk tops for hand spinning; primarily for weaving and knitting.

Texere – Tussah Silk Tops - degummed and combedsmooth tops with the fawn color natural for Tussah silk; for hand spinning and then suitable for weaving and knitting.

Texere – Regency Silk - A fine 100% spun dyed shantung style 60/2 nm; 2 fold suitable for weaving, hand and machine embroidery.

Texere – Thai Silk - A double knitting thickness, pure bleached wild silk for embroidery, knitting and weaving (3/1 nm).

Texere – Tussah Silk DK (35129) - A double knitting thickness, bleached wild silk noil suitable for knitting and weaving (5.6/3 nm).

Texere – Tussah Silk (15133) - A pure natural coloured blend wild silk noil suitable for weaving (11.3/1 nm).

Texere – Bourette Silk Ecrú (35122) - A double knitting thickness, undyed pure mulberry silk suitable for dyeing, knitting and weaving (6.2/3 nm).

Texere – Arctic Silk - A double knitting thickness bleached pure mulberry silk suitable for dyeing, knitting and weaving

(6.2/3 nm).

Texere – Fantasy Silk - A double knitting thickness, bleached filament tussah silk ideal for dyeing, embroidery, knitting and weaving (3/1 nm).

Thread Gatherer – Silk n’Colors - hand-dyed 12 ply (3 groups of 4).

Thread Gatherer – Silken Chenille - hand-dyed; good for being surface couched or as part of tassels.

Thread Gatherer – Silken Pearl - Cordonnet twist silk, a very tightly twisted 3 ply buttonhole silk, in size 30/3 - approximately size 8-12 pearl, size 15/3 - approximately size 5-8 pearl.

Threads to Dye For – single ply hand-dyed.

Trebizond – Twisted Silk Thread - filament silk with a high luster, tightly twisted.

YLI – Silk Floss - 6 strand divisible, Kanagawa silk.

YLI – Buttonhole Twist - tightly twisted 3 ply Kanagawa silk.

Zwicky – Silk Floss - from Switzerland, 4 ply, filament silk with a slight twist, and shiny.

Websites for some of the products listed:

Alyce Schroth - <http://www.alyceschroth.com/>

Au Ver a Soie - soie.fr/ <http://www.au-ver-a-soie.fr/>

Caron - <http://www.caron-net.com>

Leon Conrad Designs (Ebony Collection) -

<http://www.leonconraddesigns.freeserve.co.uk/>

Gloriana - <http://www.glorianathreads.com/>

Kreinik - <http://www.kreinik.com>

Needlepoint Silk - <http://www.needlepointinc.com>

Pearsalls - <http://www.pearsallsembroidery.com>

Piper Silks - <http://www.pipers-silks.com/index.htm>

Rainbow Gallery - <http://www.rainbowgallery.com>

Texere - <http://www.texere.co.uk/>

Thread Gatherer - <http://www.threadgatherer.com/>



Medieval Woodcut of women producing cloth

Bibliography

“A Stitcher’s Guild to Silk Thread”. Published by Kreinik Manufacturing Co. Inc. 2001.

“A Fine Quality Embroidery from Llan-gors Crannog, near Brecon”, by Hero Granger and Frances Pritchard. Published in *Pattern and Purpose in Insular Art*, edited by M. Redknapp, N. Edwards, S. Youngs, A. Lane, and J. Knight. Published by Oxbow Books. 2001. ISBN 1 84217 058 9.

“Textile Finds in the People’s Republic of China” by Hsio-Yen Shih. Published in *Studies in Textile History*, edited by Veronika Gervers. Published by Royal Ontario Museum. 1977. ISBN 0-88854-192-9.

“The Development of the Textile Crafts in Spain”. Articles by A. Wittlin. *Ciba Review* 20. April 1939.

A Pictorial History of Embroidery, by Marie Schuette and Sigrid Muller-Christensen. Published by Praeger. 1964.

Bazaar to Piazza: Islamic Trade and Italian Art, 1300-1600, by Rosamond E. Mack. Published by University of California Press. 2002 ISBN 0-520-22131-1.

Flowers of Silk & Gold: Four Centuries of Ottoman Embroidery, by Sumru Belger Krody. Published by Merrell in association with The Textile Museum, Washington DC. 2000. ISBN 1 85894 1059.

Silk, by Jacques Anquetil. Published by Flammarion 1995 ISBN 2-08015-616-X

Textile Conservation and Research, by Mechthild Flury-Lemberg. Published by Schriften Der Abegg-Stiftung. 1988 ISBN 3-905014-02-5.

Textiles and Clothing: Medieval

Finds from Excavations in London 4 c. 1150-c. 1450, by Elisabeth Crowfoot, Frances Pritchard and Kay Staniland. Published by HMSO. 1992 ISBN 0 11 290445 9.

The Book of Silk, by Philippa Scott. Published by Thames & Hudson. 1993. ISBN 0-500-28308-7.

The Conservation of Tapestries and Embroideries: Proceedings of the Meetings at the Institut Royal du Patrimoine Artistique Brussels, Belgium September 21-24, 1987. Published by The Getty Conservation Institute. 1989 ISBN 0-89236-154-9.

“The Conservation of Embroideries at the Intitute Royal du Patrimoine Artistique” by Juliete De boeck, Vera Vereecken, and Tatiana Reicher.

“The Restoration of a Twelfth Century Liturgical Sandal at the Musee Historique des Tissus in Lyons” by Marie

Schoefer and Denise Lestoquoit.

The Silk Industry of Renaissance Venice, by Luca Mola. Published by Johns Hopkins University Press. 2000. ISBN 0-8018-6189-6.

The Story of Silk and Cheney Silks, by H.H. Manchester, A.B. Published by Cheney Brothers. 1924.

** Interesting hints of works without pictures or citations found in my reading. Further exploration of these will be undertaken and the results posted on my website, but unfortunately post publication of this article — Sabrina



Strandanous Vermis Sericus - engravings depicting the stages in the manufacture of silk. Italian 16th C.

“My Gracious Silence: Women in the 16th Century”

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This book of engravings is dedicated to the Florentine nobility and in particular, one Raphael Mediceo. The engraver is Ioannas Stradanous. Translations of the text are approximate. The entire book is only the 6 engravings.