POLYCHROME SAMITE

Working Backward Into Antiquity

Contribution to the Archaeological Study Group
Complex Weavers 2022

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Polychrome Samites – Working backward into Antiquity

Samites are defined as a compound weft faced twill. In two colors, similar to taquete (compound weft faced plain weave), is a fabric that uses the structure of plain weave or twill as a binding and a second, or main warp to guide the weft threads on the face or the back side of the fabric. Weft threads are woven in alternating colors. While taquete is reversible, samite based on a 2/1 twill is different on the back side of the fabric because an uneven twill is by definition not reversible.

Polychrome versions of samite are possible and lovely. They are also not easy to design and weave. Here are two typical roundels. Detailed information found in source material ((Verhecken-Lammens, De Moor and Overlaet 2006)).

Above: Two examples of samite fabrics from the Middle East (7th -8th century) showing typical motifs with animals in a "roundel". On the left, the weaver used three colors, but only two at a time in bands. In the center, there are three colors used simultaneously throughout. The third example, on the right is my reconstructed 4-color tram silk roundel produced on my pattern shaft drawloom.

My introduction to the samitum fabric structure came, not with a manual loom as in antiquity, but on the TC-1 hand Jacquard loom with control over each warp end independently. The textile pictured below was woven in a Jacquard class at Eastern Michigan University in Aug. 2007 under the tutelage of Pat Williams and Catherine Amadei. The class explored polychrome samite or taquete on the TC-1.

This is **a 4 color samitum** representation of a William Morris textile using my choice of color.

This piece is woven on a TC-1 loom with 1320 threads of 20/2 unmercerized cotton, sett 18/cm, 72cm wide. Weft material is 20/1 linen doubled in four colors.

The loom was already set up with alternating warps in a warm and a cool taupe, so the image needed to be reduced to a single repeat, tiled, and rendered /tested to provide a good aspect ratio.

Designing in multiple colors on the Jacquard loom involves determining all the possible combination of the chosen structure – in this case a total of 14. From these possibilities, I chose 8 for the fabric.

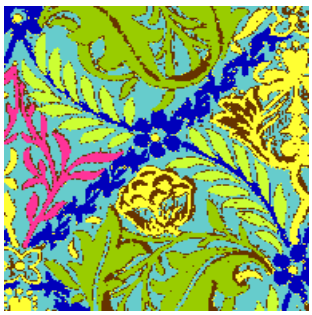
There was an initial choice between polychrome taquete or samitum – the color blanket shows the difference in the structures – samitum on the top and taquete on the bottom:

The upper rows in samitum were much richer and more pleasing – so that is where the project proceeded.

The structure is a 6-end samitum based on a 1 / 2 twill in a 1:1 ratio of main warp to binding warp. And here is a detail of the structure showing the color mixing in the actual piece.

For polychrome weaves, the structure profiles contain a pick for each color for each step of the weave. In this case a step of 4 colors over 6 warp ends was one passe, and 3 steps of 4 colors (12 picks) formed one decoupure (smallest number of ends and picks that form one pixel of the design.

With the Jacquard loom, the weaver literally paints with structure, so the 8 chosen colors were painted into the single pattern repeat shown at left. This made designing with color mixing rather easy as some of the 8 colors had 2 or three of the colors mixed on the surface.



Designing for a shaft loom or even a drawloom would complicate the detailed nature of the polychrome effect.

As with any tied weave, there is also an issue with differential takeup – the main warp does not intersect with the weft so while this piece is lovely, the 34 x 27-inch fabric is all that could be produced on the loom that day and we had significant warp breakage. Over the years, I have attempted to reproduce the cloth, but ran into technical difficulties at every turn. A warp at the correct density, alternating on two beams was not easily found. There is one TC-2 available for rental by the month in Iceland with the correct number of heddles at 30 epi, suitable for a woolen fabric, but sampling would be quite difficult, let alone leaving my home and husband for weeks at the end of the world.

A Possibility Opens

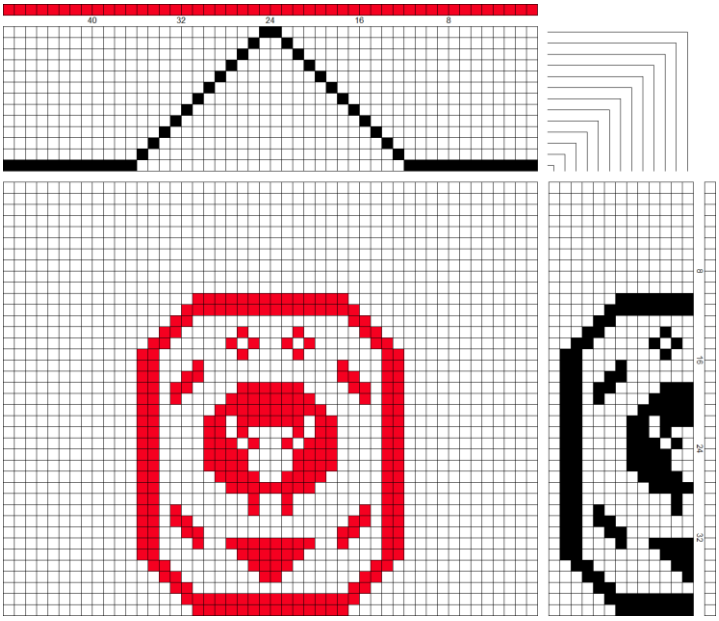
When I began doing samples and experimentation with tied weaves on the drawloom for a presentation to be given Summer 2020 at Complex Weavers Seminars, taquete and samitum were among the structures considered for inclusion. Fascinated by the results of this polychrome samite I had woven years ago, I became interested in the Sassanian samites – sometimes 2-color, sometimes polychrome, woven on some type of draw device in the 7th to 10th centuries in the middle East.

Over the last 2 years, I have systematically worked from the TC-1 technologically backward to create a **4-color polychrome samite on my pattern shaft drawloom.**

Since the samite can be woven on Jacquard loom, dobby loom or some type of draw or “double harness” loom, The planned study began with the dobby loom, recreating as closely as possible the structure, material and density of the Morris samite from the TC-1.

Samite is an old fabric from the Middle East – 9th and 10th century Persia. It is a very difficult fabric to produce requiring fine silk threads and much time and patience to set up and weave the fabric.

Since the older fabrics from the Middle East are generally “roundels” containing a heraldic animal or two plus decorative elements, I designed a roundel containing a single sheep and decorative elements that can be woven on a 16-shaft dobby loom using 13 threaded blocks plus the 3 ground shafts needed for the twill foundation. On the pattern shaft drawloom, 13 pattern shafts will be used to duplicate the design. This design will serve for all woven samples so the comparison of texture, drape and hand have the same base.



Basic profile design for samite samples. Works for 16-shaft dobby as well as pattern shaft drawloom.

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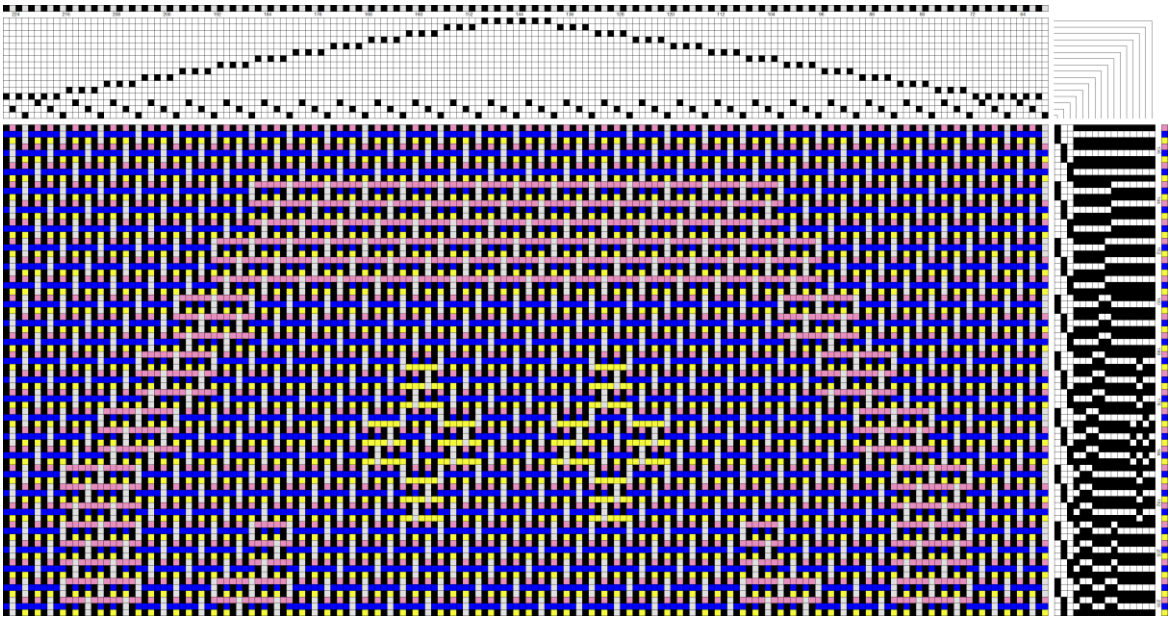
Below are shown the three liftplans for the two-, three- or four-color versions of the same design.

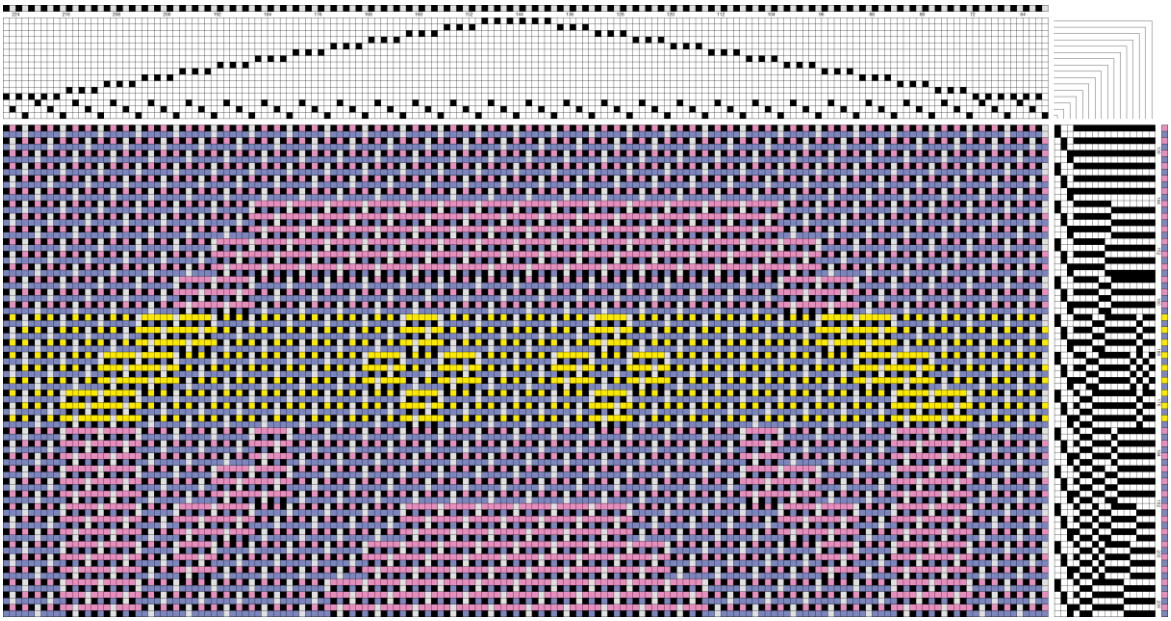
2 Color Draft – Dobby Liftplan for 16 shafts. Each decoupure (smallest element of design or pixel) consists of 6 warp ends and 6 picks – ratio 1:1)

Note, 3 colors are used by alternating stripes of two pattern weft colors.



Sheeproundel2 – 2 color

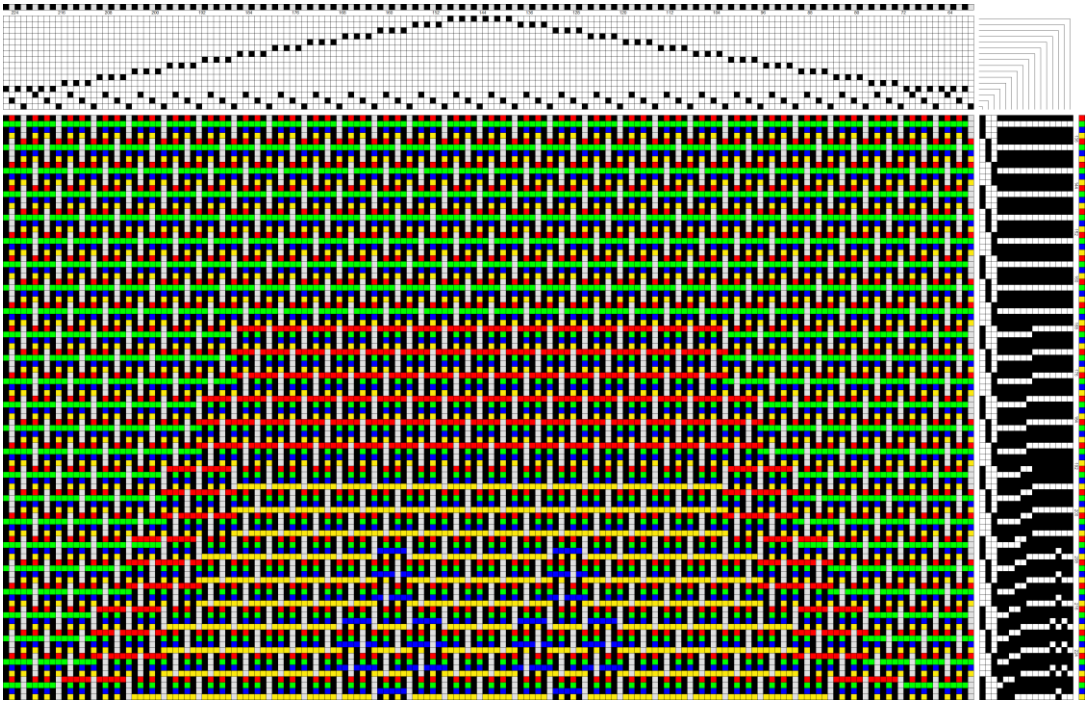
3 Color Draft – Dobby Liftplan for 16 shafts. Each decoupure consists of 6 warp ends and 9 picks – ratio 1:1)



Sheeproundel2

3-color

4-Color Draft – Dobby Liftplan for 16 shafts. Each decoupure consists of 6 warp ends and 12 picks – ratio 1:1).



Sheeproundel2 - 4color

Warp 1

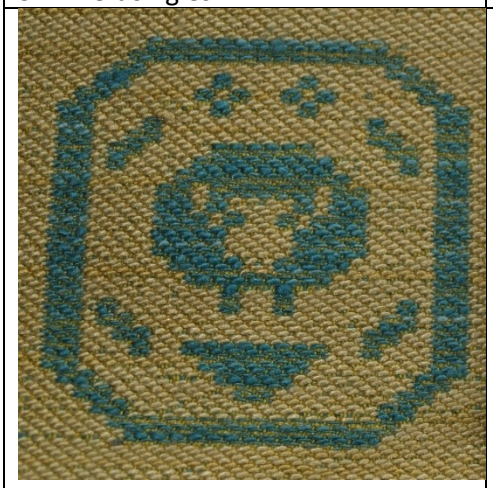
To begin this journey, I used 20/2 cotton as in the original fabric (this time mercerized) sett at 18 ends/cm as before. Weft used was 20/2 mercerized cotton doubled, 20/1 linen doubled, or silk. Each weft material produced a different look and hand for the fabric. Historical material refers to the number of “warp units” per cm. A warp unit is the group of main and binding thread contained in one pixel of the design. In this case, with a ratio of 1:1, a warp unit contains 2threads (one main and one binding) for a measure of 9 warp units per cm. This is considerably coarser than the historical fabrics that vary from 12 to 20 warp units per cm.

Cotton Weft		
		
2 Color	3-Color	4-Color

Here are the same three roundels, woven with a linen weft

Linen Weft		
		
2-olor	3-Color	4-Color

Lastly, I used a silk weft on the cotton warp

Silk Weft singles		
		
2-Color	3-Color	4-Color

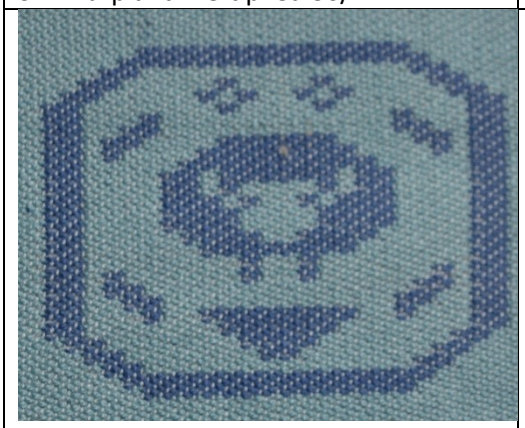
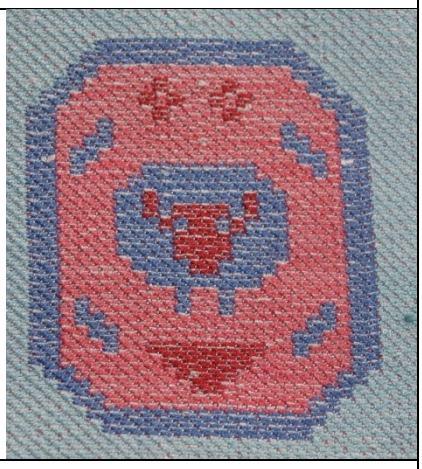
This warp, as close to the original used on the TC-1 produced similar fabric. The cotton weft produced intense colors and a well-defined twill line. The hand was rather stiff.

The linen weft produced less intense colors and a less well-defined twill line. The hand of the fabric was a bit more supple.

The silk weft produced a good coloration and softer hand, but still with definite twill lines.

WARP 2 – 60/2 silk, ratio 2:1 weft plies and singles

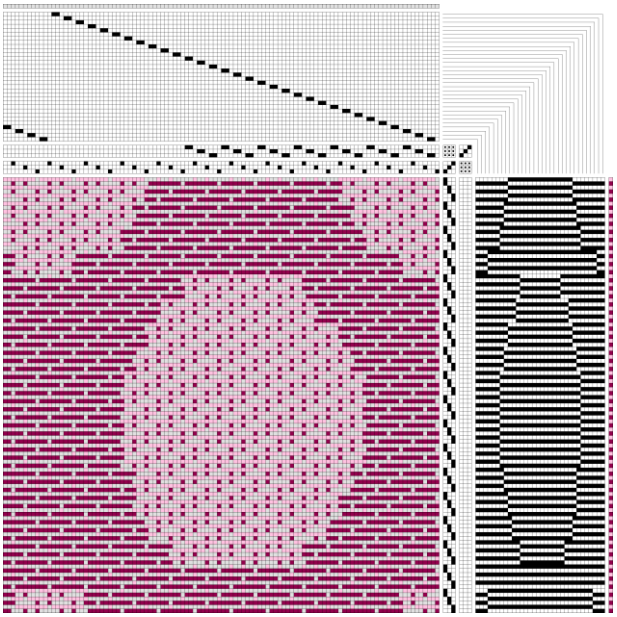
Here I used a 60/2 spun bombyx silk – white. This yarn was considerably finer than the 20/2 cotton so I used a ratio of 2:1. There were 2 of the 60/2 silk warps for every binding warp. The examples in the Koestner paper (Koestner 2020) indicated that the multiple main warp ends showed no crimp from interlacing and appeared to have been in a single heddle together, so I placed 2 warp ends in each main heddle. This puts 3 warp ends into a "warp unit" so the sett here is 10 warp units per cm, with the thread count 30 ends/cm.

Silk warp and weft plied 30/2		
		
Silk warp and weft - singles		
		

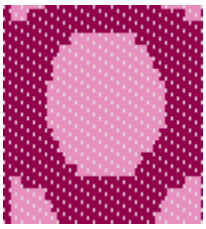
Continuing with silk warp and weft, coupled with an extra warp end between the binding ends produced a smoother fabric with strong colors. The hand was much more supple than with the cotton warp. The singles weft yarns gave a subtler twill line and softer hand. Using plied weft stiffens the fabric.

Samitum on the Drawloom

Again, only the tie down warp is treadled. This 3-end twill requires 3 passes of two picks (6 picks) to complete the decoupure. This, as with taquete, will require heavy lifting on a modern drawloom. The most efficient setup would be for a set of pattern saving lashes with an A and B cord for each pattern row. Then each set of cords would be pulled three times for the decoupure.



This is the draft for a 2-color samite that is woven at the end of a lampas warp using a 3-end twill for both ground and secondary warp. The draft shows that whether the long eye heddles are threaded or not does not make any difference in the construction of the fabric.



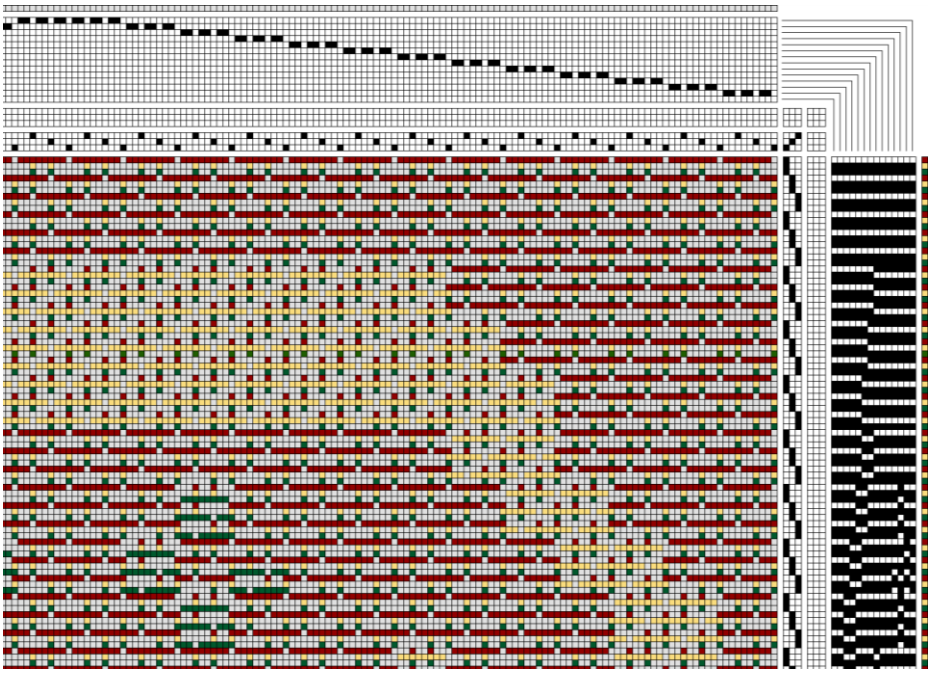
Here is a simulation of the resulting fabric.

Historically, samite was woven with designs in roundels that were often polychrome, that is in more than 2 colors. The easiest way to add a third color would be to follow this draft and place weft color band sections that coordinate with the pattern and add color interest to the design.

The more difficult version of this is the 3-color polychrome samite, detailed on the next few pages. The pattern was developed as just 2 colors, and then the liftplan altered to show a third color in a few areas.

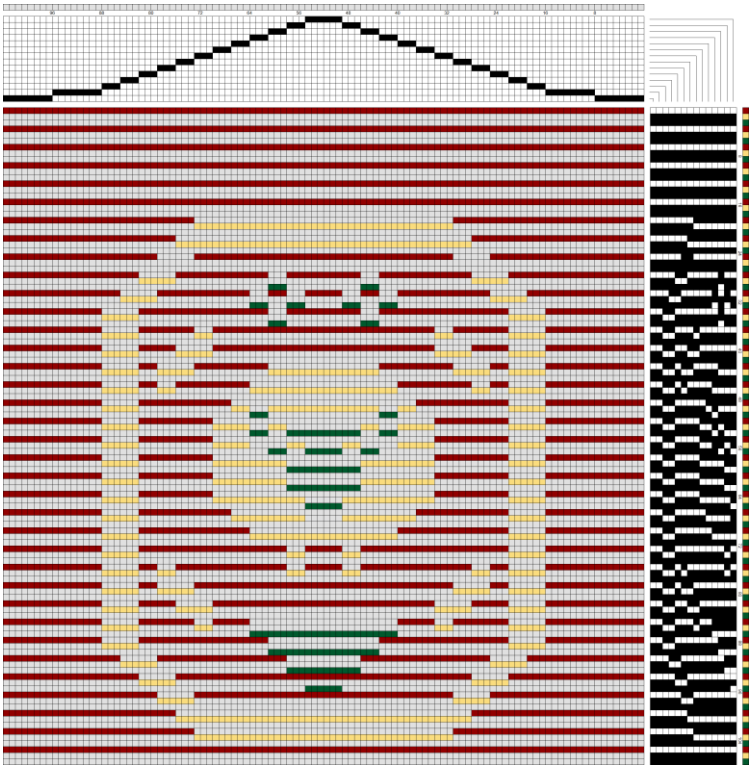
Polychrome Samite

Here is the draft for a 3-color roundel in samite. A pass is 3 picks, a decoupure is 3 passes. For each graphed pattern row, 9 picks are needed. To correct the aspect ratio, 2 graphed pattern rows are woven. This makes 18 picks per pattern row.

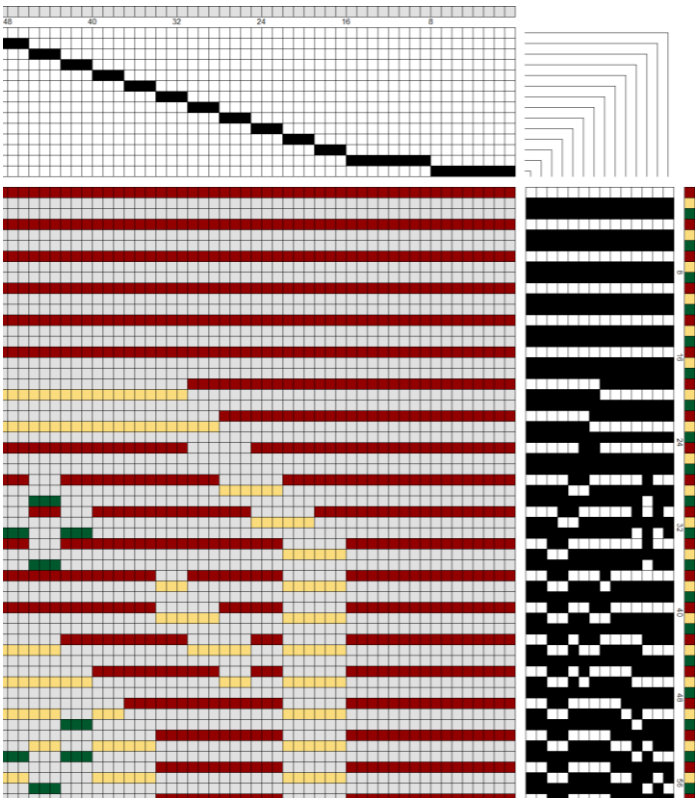


Note that the color sequence is arranged so that when weaving background areas, the background color is woven with no cords or pulls and the colors not to appear on the surface are placed together so that they can both be woven with the opposite – all cords pulled.

The next diagram is the one used to actually execute this fabric. There is only one “row” shown for each pattern row(decoupure). It is understood that when weaving, each of these “rows” should be executed at least three times – once for treadle one, once for treadle two and once for treadle three. In the case of the sample presented here, each “row” needed to have this sequence executed twice (2 decoupures) to make the aspect ratio appear more squared.



It proved easier to follow in this format, showing the alternation of pattern rows and colors than trying to follow each pick in the file. The expanded detail on the next page shows a detailed view of the liftplan for a 3-color rendition of the roundel design.



Expanded detail for 3 color polychrome samite.

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WARP 3 – tram silk ratio 2:1

Tram silk single warp and weft		
		
2-color	3-color	4-color (4 colors used only where needed)

My sources for the ancient samite fabrics listed "tram silk" as the thread used. Tram silk is the fine thread reeled from cocoons and skeined carefully onto reels. I had some very fine Italian reeled silk (somewhat lightly spun as well) in white to use as warp. Recently Lunatic Fringe began carrying a limited color choice of tram silk. It is slightly heavier than my Italian silk, so used the Italian thread doubled to wind the warp. I also used a 2:1 ratio (2 doubled warp ends in a heddle for the pattern and 1 doubled end for the binding end. Again, there are 24 warp ends/cm and with 3 threads per warp unit or 8 units per cm.

What a difference. The rather stiff, ribbed twill fabrics produced earlier on the TC-1 and dobby looms gave way to a supple, smooth, shiny, slippery fabric that began to resemble the photographs in scholarly articles. The average density of 12-20 warp units/cm puts my samples at about double the thickness of the ancient fabrics. I did try a short sample with an all over pattern on the end of the warp. The results were so nice, I intend to continue experimenting – next time, the Italian silk warped singly and paired with some extremely fine tram silk purchased from Maren Beck at Above the Fray. The initial designs are in planning.

Commercial samite, 100% silk	Front	Back
		

Contemporary Mill Woven Samite – 100% silk. Source https://www.sartorbohemia.com/samite-with-byzantine-medallions-midnight-blue_z8778/

Observations and Conclusions

Samite is a lovely fabric. Now that I have seen and made several samples, it is a fabric that shows pattern and drape in a way that is unique. I can see why it was revered as the most expensive fabric of its time. I can also see why samite fabrics morphed int proto-lampas, pseudo-lampas, pseudo-damask (The Weaving Library n.d.) The difficulty setting up this fabric and the extremely slow nature of the weaving shows why samites are seldom woven today.

The evolution of woven goods proceeded toward patterned fabrics that involved much less heavy lifting of pattern pulls

Planning samite fabric entails far more than simply seeking a nice warp and weft. Singles seem to pack better than plies. The weft yarn seems to want to be just a bit heavier than the warp, but not double. Doubling the pattern rows elongates the roundel more than adding another color or two. On a drawloom, the pattern threads do not need to pass through long eyes on a ground shaft. Tension difference between pattern and binding warps shows after short while.

A 1:1 setup is, tedious unless tying on from a prior setup. Three color work is time consuming and probably best only in selected areas.

Samitum is a smoother version of taquete – provides contrasting color effects with a very nice surface.

Samite is not easy to weave on the drawloom because of the requirement that each pattern row must be executed first as a positive and then as a negative. Even if done with pattern lashes, 2 lashes per pattern row are still needed.

For 3 color patterning, 9 picks are needed for a decoupure, for 4-color patterning 12. This slows the process considerably. This explains why color changes sometimes occur as stripes in a 2-color sequence.

4 color required intense concentration and finding 4 colors with good contrast was difficult

The aspect ratio of taquete and samite are controlled somewhat by the ratio of the warp threads. I found that a 2:1 ratio worked well with 3 color fabrics. 1:1 is better for 2 color work, but that is very tedious to set up. It is clear from the samples, that the height of the roundel differs with the relationship of the number of colors and the number of warp ends between the binding threads.

Also, using an extra color for polychrome effects is easiest when done in carefully planned stripes in the piece rather than alternating 3 or 4 colors. The idea to use 4 colors only where they are used came from (Verhecken-Lammens, De Moor and Overlaet 2006).

Books always refer to samite as an early drawloom weave. The period where it was popular was from 1st to 11th century. We do not know what type of “drawloom” might have been used. It is clear that the “pattern harness” of today’s drawlooms, with the shafts of long eye heddles was not needed, though it could have been present. The minimum requirement would have been for 3 ground shafts and some way to pull selected threads by means of lashes. There may have been some type of loom we are not aware of specifically designed to make the manufacture of this luxury fabric more feasible.

Taquete and Samitum were probably the first two tied weaves historically. Lampas came later.

Historically there were a few interim fabrics on the way to the next class of tied weaves. It seems that they were steps to move from the stricture of only plain weave or only twill in a compound fabric. Proto-lampas and Pseudo Lampas are two of those that incorporate more complexity in the cloth.

The terms proto-lampas and pseudo-lampas are discussed in John Becker’s “Pattern and Loom” and in following sources:

Sources that discuss these developments include:

John Becker, “Pattern and Loom”, pp. 133-168

From the Medieval Textile Study Group (Complex Weavers)

https://www2.cs.arizona.edu/patterns/weaving/webdocs/mnm_mt31.pdf

http://www.medievaltextiles.org/gallery/gallery.html

http://www.weavinglibrary.org/2012/11/taquete-samit-and-lampas-proto-lampas.html

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