Exploration of the Weave Structure of the Shroud of Bernard of Clairvaux
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I was a member of the Medieval Textiles Study Group (MTSG) in the late 1990's and early 2000's and was intrigued by the description of the shroud of St. Bernard of Clairvaux by Carolyn Priest-Dorman, which was published in the December 2001 issue of the MTSG newsletter: http://www.medievaltextiles.org/news30.pdf A version of this article by was published in the December 2002 issue of the Complex Weavers Journal (CWJ).

The original 12thC piece was unusual in that it was completely linen-free. The warp was a fine hemp of about the weight of a 20/2 cotton, with heavier cotton for the ribs. The weight of the fine cotton weft was about 12/2. In that time, hemp for weaving was relatively difficult to acquire at reasonable prices and in a range of sizes. I wove my sample for the MTSG 2004 sample exchange in 20/2 cotton for the finer warp (substituting fine cotton for the hemp) sleyed 3 ends per dent in a 12-dent reed, 5/2 pearl cotton at 2 ends per dent for the heavier cotton warps, and 14/2 cotton for the weft. I used various shades of deep pink to see the weave structure better. The sample wet-finished at 36-epi over the entire warp compared with 37-epi in the medieval piece. In late December of 2004, I submitted my sample. The sample is seen at http://www.medievaltextiles.org/gallery/gallery4.html

The sample had a nice feel and drape. Weaving it was not really a challenge because it was less than a yard long, but I suspected that the longer floats of the heavier warps making the vertical ribs would eventually cause tension issues over the longer length of a shroud. The hemp/cotton blend of the original would have been quite expensive for the 12thC, possibly because Bernard of Clairvaux was highly regarded and later canonized as a saint. I thought that it was quite probable that this weave would have also been worked in linen and wondered what the result might be in a more common fiber of that era. Linen would be closer in feel and character to the original hemp than the 100% cotton I'd used in 2004 and might give a better sense of whether there would be tension issues over a long warp since linen is less forgiving than cotton. I thought I'd explore this draft more fully in the future, but that day just never seemed to arrive.

Flash forward to Christmas 2017 … I asked my dear husband, who never had asked for much of anything from my weaving, what he wished me to weave for him. Curtains. Curtains for the wall of unadorned windows with a lovely view of Mt. St. Helens to the north. After many years, he confessed that he really wanted a bit more privacy from the occasional dog-walkers in the park behind us. I recalled the draft of the shroud and thought it might be perfect for a wall of curtains, especially in neutral tones.

I decided to first weave a prototype as a test. For my prototype, I purchased Henry's Attic 40/2 Normandy linen (bleached). I used the yarn singly for the ground design and tripled for the ribbing, and sleyed the entire piece at 3 ends per dent in a 12-dent reed. The weft was 16/2 linen (natural). I measured a 921-end warp of 5 yards. I used a Tools of the Trade jack loom,

warping from front to back. I beamed it all at once, using sticks on the warp beam. I tied directly onto the front. I did not require any additional humidity to "tame" the linen, and did not break any warp threads. I added doubled ends of the 40/2 on each side for floating selvedges. Thin sticks served as the header and a firm foundation for the weaving.[1]

As expected, the warp threads of the ribbing, with fewer interlacing than the ground design, started to sag noticeably by the end of the first yard and was too much of a challenge to continue without adjustment by the middle of the second. I used a warp stick on edge behind the heddles to aid the shed. I cut off and re-tensioned to complete the second 2-yard panel, with the same tension issues. To finish, I completely wet the pieces and then machine washed them in warm water with Dawn, used a slower spin speed, then pressed dry. The yardage, which started at about 25.5" in the reed, finished at 23.5" or about 39-epi (shrinkage of 8%). I made two curtain panels, finished top and bottom with rod pockets and hems respectively, and hung them in a bedroom window as a test. The curtains themselves were a success, and the yardage was probably fairly close to the weight and drape of the original shroud. The Henry's Attic bleached linen made a beautiful warp that had a lovely sheen after finishing, but it was expensive. The fabric was certainly something that could be used as a shroud, blouse, or dress.

However, the prototype curtains blocked quite a bit of light when tested on the north-facing window in the living room. I also needed a much wider panel for the significantly larger windows. I decided to make a wider warp of about 44" and have a single flat panel on each window rather than two ruffled ones. I also opted to widen the sett to 3 ends per dent in a 10-dent reed to increase the transparency. I was concerned about the overall cost of using the Henry's Attic linen; Webs had a well-timed sale on their 40/2 half-bleached linen. The Webs linen was slubbier but had an appealing texture. I had plenty of the natural linen for weft. I measured off 1327 ends of the 40/2 linen for a 12 yards warp and used the same loom and front-to-back process as for the prototype bedroom curtains.

As expected, the ribbing warp tension started to worsen as the weaving progressed. After about the first yard, I inserted a stick under the ribbing ends behind the heddles, carried the stick to the back, and then weighted it with six 1# deep sea fishing weights to keep tension (as sort of make-shift double back beam). This was a great solution for two panels worth of warp length or about 5 yards. I cut off, re-tensioned, and wove the second pair of panels the same way. There was about 27" of loom waste. I finished the cloth using the same process as the sample panels. The resulting curtain cloth finished at 41" and 32 epi (shrinkage of 7%). The sheerness was just about perfect for the intended use, but very close to being sleazy. Tom had his curtains (and privacy) by Christmas 2018.

[1] In a recent thread on WeaveTech, several contributors shared their experiences with weaving linen and most said that they had to take certain measures to weave linen successfully, such as using only a countermarche loom, lightly spraying their warps with water, tensioning certain ways, using certain shuttles, etc. I've woven hundreds of yards of linen ranging in size from rug warps to 70/2, and some techniques and equipment work better than others, but I have never had to take extreme measures or use certain tools exclusively to "tame" the linen.

The upper photo is the prototype cloth at 39 epi using Henry's Attic 40/2 bleached linen for the warp; the lower is the final cloth at 32 epi using Webs 40/2 half-bleached linen as the warp. The prototype (top) was a prettier cloth, but the final version (bottom) was a better curtain at much less cost. The prototype was probably a good approximation for the 12thC shroud worked in hemp and cotton, which finished at 37epi. The diamond pattern between the heavier warps is easier to see in the prototype, but is still very faint since there is very little contrast between warp and weft coloring.

Four semi-sheer panels in place in the living room

What might this mean for the medieval shroud? By the 12thC, Europe south of Scandinavia had pretty much transitioned from the warp-weighted loom to the floor/shaft loom for production of cloth. If a floor loom were used, the weaver(s) would have experienced the same tension issues with the ribbing warps as I did (unless they also used a separate tensioning device for the heavier warps). A warp-weighted loom would have been able to correct for those tension issues as the cloth was rolled on the cloth beam and the warp advanced. Diamond designs were woven very early in Europe on warp-weighted looms, so it's possible that this pattern was

originally woven on a warp-weighted loom without tension problems, and those tension problems were realized when the design was transferred to production on the floor loom. It would be difficult to prove this without archaeological evidence.

So where do I go from here? First, I'd like to do a bit more research on the original shroud, using the references cited by Priest-Dorman in her articles. Second, I'd like to weave a true reproduction. Hemp is becoming much more accessible, so I could use hemp and cotton. However, I'd need to conduct research to discover if the yarns were singles or plied, the degree and direction of the twist, and any other characteristics of the fibers before weaving the cloth.