

# Tularosa Diamond Twill Fragment: a window into the past

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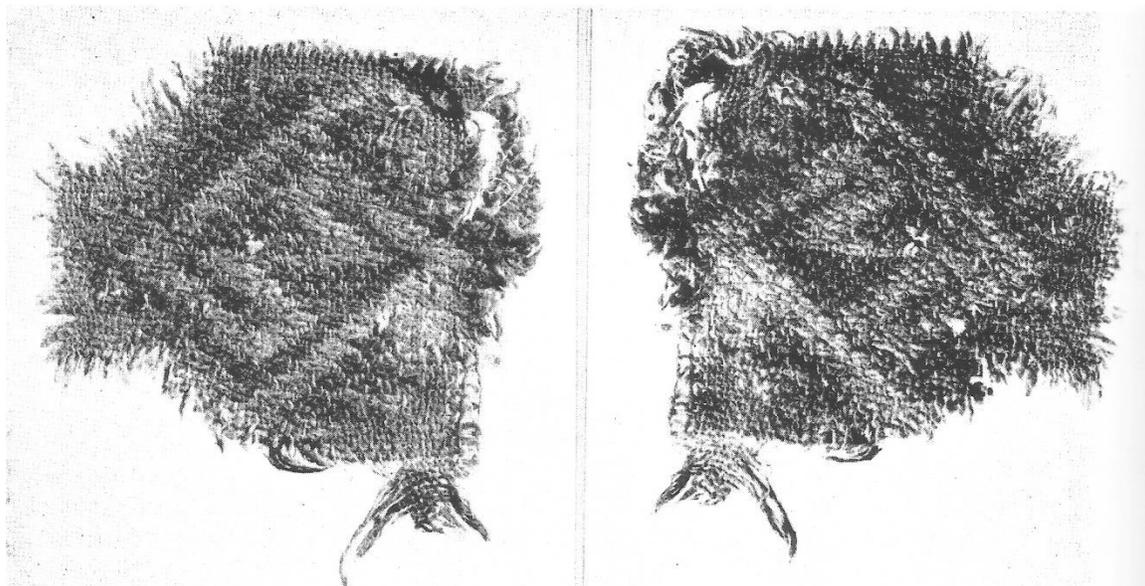
Contribution to Complex Weavers Archaeological Textiles Study Group

In 2012, I became interested in the use of twill in tapestry after reading Clotilde Barrett's, *Boundweave*, in which she discusses briefly the use of the technique for tapestry weaving (1982: 77). I began searching for examples of boundweave tapestry online which led to a search for twill tapestry when I found intriguing examples in Kate Peck Kent's *Prehistoric Textiles of the Southwest*. One in particular caught my eye: an illustration of the design and weave structure of a small cloth fragment from Tularosa Cave in New Mexico (Figure 98 A, Kent 1983: 166-167).

When I first started looking into twill tapestry, I was only interested in finding examples of the twills used for tapestry by different weavers. But, Kent's illustration of this fragment kept coming back to me. It was different because the weave structure of the cloth is plain weave while the motif is created using diamond twill. In 2015, I did a little research about this fragment and presented a lecture and workshop about it.

Now, I am returning to, and attempting to reconstruct, my 2015 research from notes and photocopied images I took at the time, as the starting point for a more in-depth study of this cloth fragment. In this article, I will use my notes and photocopied pages to describe this woven fragment, Kate Peck Kent's analysis of it and my own experiments in 2015 and this year based on Peck's analysis, followed by a brief discussion of some of the future research questions I would like to explore.

## The Tularosa Diamond Twill Woven Fragment



*Unless otherwise indicated, all images in this article are scanned photocopies from the referenced texts and are included here for educational purposes only. Please do not publicly share this document until proper permissions can be obtained.*

The image above is a photocopy I made from Kate Peck Kent's 1957 text, *The Cultivation and Weaving of Cotton in the Prehistoric Southwestern United States*. It shows the front side of the cloth on the left; the back side on the right. From these images, it is clear that the design on the cloth is not brocade or supplementary weft. Kent described the fragment as a four-thread diamond twill. "This is a tapestry weave, with blue, brown, and natural white wefts which interlock at points of contact. The interlocking takes place along the edges of diamonds. Wefts are tied in with square knots when first introduced. Additional lengths of thread added in the midst of a colored section are not tied, however, but overlap for a short distance. The twill design is set into a plain weave cloth. It may have been a unit pattern on a large cloth, or one of a series of design units placed along the border of the cloth, or at the end of a plain weave sash" (Kent 1957: 544-545).

Elaine Bluhm, in her analysis of the textiles found in Tularosa Cave (in Martin et al. 1952: 299), described it as having "a geometric design [...] sawtooth lines and a key of interlocking triangles. ... The design resembles some on the Reserve Black-on-White pottery .... the original colors were probably blue or green, black and .... The design was produced by using different-colored weft ... which were interlocked at their common boundary, and varying the under-one-over-one pattern by skipping warps." (The ellipses in this quote are due to the poor quality of the photocopy I have on file.)

In 1983, Kent mentioned the fragment within a discussion of "Regular twill tapestry" (162) as one of six fragments woven using a diamond twill structure with discontinuous interlocking wefts of multiple colors. "Patterns are constructed using the small diamond figures automatically produced by maintaining a regular heddle order as units of measurement or building blocks. Oblique lines are established, for example, by the slanting edges of the diamond."

Kate Peck Kent places the Tularosa Diamond Twill fragment within the Mogollon 5 culture time period, which coincides with the time period of Classic Mimbres culture, 1000 – 1450 AD (Wheat, 1955). I have been unable to discern from my original notes why she places the fragment within Mogollon 5, though she does describe in both texts a potential heddle rigging to create the diamond twill pattern. This, coupled with the presumed arrival of a "true" loom (using heddles) to the region around 1000 AD and the fragment's deposition within the cave are likely reasons for the designation.

Kent described the heddle rig in 1957 (545) as follows:

"The four heddles control the following warp sets:

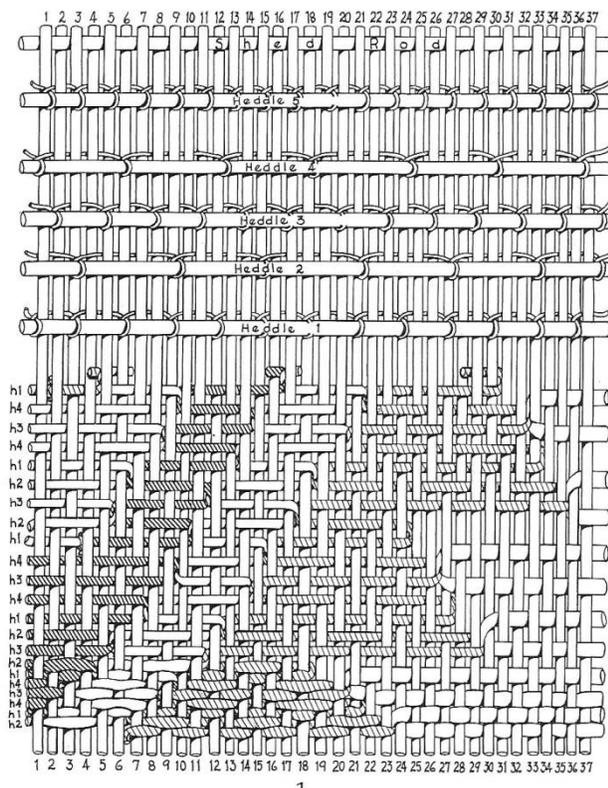
Heddle 4: - 2 3 4 - - - 8 9 10 - - - 14 15 16 - - - 20 21 22

Heddle 3: - - 3 - -6 - -9 - -12 - -15 - -18 - -21 -

Heddle 2: 1 - - - 5 6 7 - - - 11 12 13 - - -17 18 19 - - -

Heddle 1: 1 2 - 4 5 - 7 8 - 10 11 - 13 14 - 16 17 - 19 20 - 22"

In Figure 98A from 1983, she also illustrated these and includes a fifth heddle and shed rod for controlling the plain weave. In this illustration, you can see the way the motif was created using diamond twill.



## My experiments based on Kent's analysis

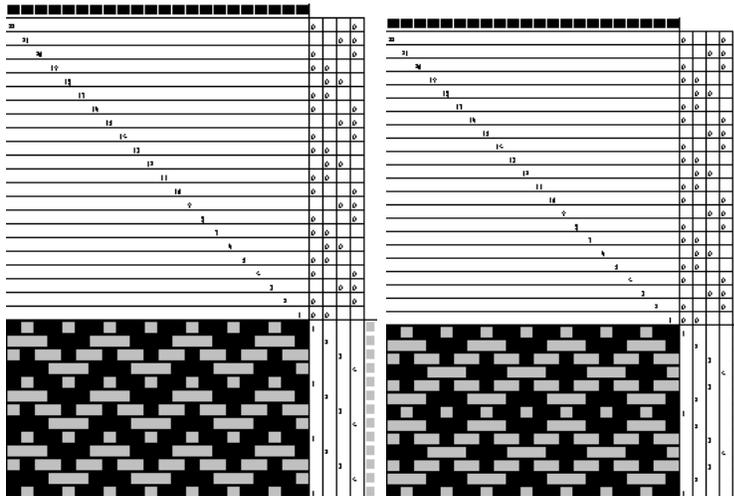
In 2015, I presented a lecture and workshop (Keeling 2015) on this fragment and another fragment in weft-wrap openwork that had been found in Bear Creek Cave, also discussed by Kate Peck Kent (1983). For that project, I created a sample of the weft-wrap fragment on a frame loom using a needle, and then tried creating the diamond twill of the Tularosa fragment on the same cloth.



I had no difficulty creating the diamond twill with just a needle and thread. Kent mentioned “bits of cotton thread from Tularosa Cave [where this diamond twill fragment was found] in levels that dated from 300 BC to AD 500. There is

no evidence the plant was grown by the Mogollon in those early years (Haury 1976:302; Martin et al. 1952:207)” (Kent 1983:28). I wondered at the time whether this fragment was necessarily created using what she called a “true” loom, which didn’t appear in the region until around AD 1000.

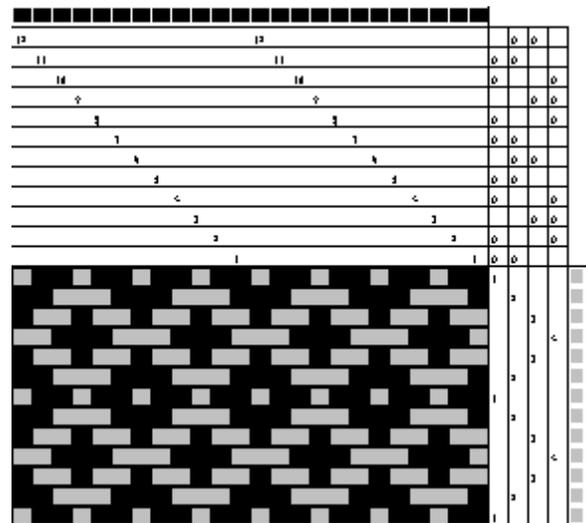
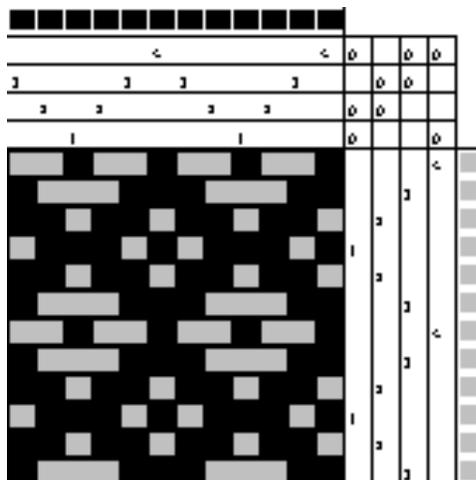
For this paper, I worked on understanding the heddle rig Kent proposed in both 1957 and 1983. Using graph paper then weaving draft software (iWeaveIt), I discovered that the diamond twill in the



Tularosa fragment is not a four-thread twill, as described by Kent, but an interleaved twill on opposites of 2/1, 1/2 alternating with 3/1, 1/3. So, we have a 3-thread twill alternating with a 4-thread twill. Here is the draft using the 22 threads Kent used in her 1957 discussion of the twill, in a straight and then point draft which results in the diamond twill found in the fragment and in my needle woven sample.

I then reduced the diamond twill to a 12 thread repeat which results in a manageable draft that could easily be remembered with practice.

This is not a diamond twill in the usual sense in which point twill is used in the threading and treadling. Instead, there are two sets of interlocking diamonds as seen in bird’s eye twill.



The Tularosa draft is similar, but not the same as a bird’s eye draft, shown at left.

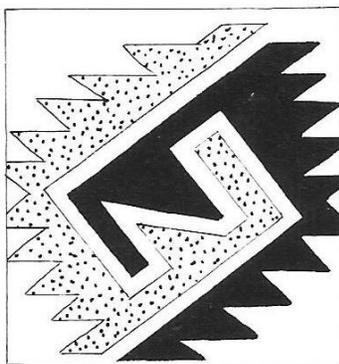
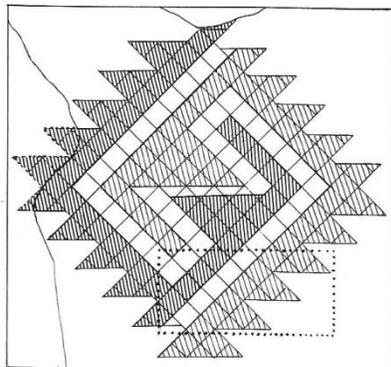
## Future research questions and lines of inquiry to pursue

When I first discovered Kate Peck Kent's research and this diamond twill fragment, I was primarily interested in how twill had been used for tapestry by others. In 2015, as I began exploring the context of this fragment more closely, I became interested in how it fit in with my previous work studying basketry in the Greater Southwest region. My next step will be to return to the sources I consulted then and expand my research to more fully understand the way this cloth was constructed and learn more about the culture in which it was created and used. Here are some of the questions I am interested in:

The discovery that the diamond twill is interleaved, coupled with the interlocking nature of the plain weave and twill in each pick suggests a skilled weaver. Kent says that the plain weave and twill threads interlock where they contact each other in the pick (1957: 544-545). How often do they interlock and where? How difficult would this be to weave with a needle versus with a loom with heddles? Is this weave structure used in any other cloth or basketry in this region? Or elsewhere? Why would a weaver use such a complicated approach to this fabric? Why not weave the entire cloth in 2/2 twill, which might facilitate weaving of the motif just as well? Is the interleaved twill significant in some way?

Are there any known examples of twill basketry with the same diamond twill patterning? It seems likely to me that basketweavers would be the natural individuals to take up cloth weaving when it was either independently discovered or introduced to the region and that they would naturally adapt their skill sets to a new medium. Yucca was a common basketry material. The fragment reminded me of diagonal twill basketry, which is prevalent in this region of the Greater Southwest. Kate Peck Kent discussed yucca fibers found in archaeological contexts which were very similar to cotton in texture and fineness (1983:20). Can a connection between the two technologies in this region be established?

Bluhm in Martin et al 1952 said the design reminded her of Reserve black-on-white pottery. How frequently is this design found within the known artifacts from the region? Is it found elsewhere? Did it hold significance within the culture or was it simply a preferred aesthetic pattern?



The design on the fragment, diagrammed by Kent in 1983 (Figures 98A and 134C) and an example of Reserve Black-on-White pottery designs from the same region.

Finding clearer images of the fragment would facilitate a better understanding of its construction. I have tried to enhance the images I have using Photoshop without success. Are all the threads the same grist and twist? In the images, the dyed motif threads look thicker than the undyed, plain weave sections. Are the dyed threads thicker than the undyed threads? I know I must have seen the dimensions of the fragment, but do not have that information in my notes. Knowing its size would help to determine the threads per inch in the weave. Are they all plied or singles? Are they cotton or possibly yucca? Examining the fragment itself would be even more helpful. It should be at the Field Museum in Chicago where the artifacts and other data from Paul S Martin's expedition to Tularosa Cave in 1952 are housed. I will try to access these archives and get better images and possibly arrange to see the fragment in person at some future date.

As you can see, many questions remain to be explored. And, others will probably suggest themselves as I continue my research. Some of them may be unanswerable, but they suggest lines of inquiry. I have a long way to go with this research and look forward to sharing what I find with all of you.

Thank you for this opportunity to share what I learn.

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- Image of Holbrook-B Reserve Black-on-white pottery bowl  
<http://swvirtualmuseum.nau.edu/wp/index.php/artifacts/pottery/little-colorado-white-ware/holbrook-b-black-on-white/> Accessed 4 December 2019