

A Field Guide to Lozenge Twill Weave in Early Northern Europe

by Christina Krupp - April 2006

This guide is intended to help people who want to weave or purchase cloth that closely resembles the lozenge twills used in the Viking Age. Technical terms will be explained and illustrated. Following the explanation of technical terms is a catalog of extant examples of lozenge twills from various times and places.

Diamond Twill vs. Lozenge Twill

I used to think the Brits called it “lozenge twill” and here in the US we called it “diamond twill.” It turns out that, while different authors have their individual preferences, for the most part, these terms are interchangeable on both sides of the Atlantic.

Here are a few examples of how some authors use the terms “diamond” and “lozenge”:

* John-Peter Wild uses “diamond” in his picture captions for both types, and “diamond (lozenge)” in his text, as seen on p. 43 of *Textiles in Archaeology*.

* Owen-Crocker depicts a 2/2 broken lozenge twill in fig. 235 on p. 293 of *Dress in Anglo-Saxon England*, 2nd edition. The caption for the image says “Diamond twill.” Owen-Crocker states on p. 293, “In English, modern experts call these ‘broken diamond’ or ‘lozenge’ twills.”

* Margrethe Hald, in *Ancient Danish Textiles from Bogs and Burials*, depicts these weaves on p. 149, figures 132 and 133. She calls them “lozenge twill, accurate meeting” and “broken lozenge twill.”

* Agnes Geijer, who usually wrote in German, published an English book called *A History of Textile Art*. On p. 70-71 she mentions “broken lozenge or diamond twill.”

However, if you’re reading Bender-Jorgensen, you must pay close attention to whether she’s referring to “diamond twill” or “lozenge twill,” because she uses each term in a very specific way to distinguish between two different weave structures. In her illustration on p. 12 of *North European Textiles until 1000 AD*, she calls the 2/1 example a “lozenge or diamond twill” because the distinction doesn’t come into play there. However, in her 2/2 examples, she reserves the term “diamond twill” for the “broken” type, and “lozenge twill” is reserved for the “even-meet” type. Here is how she explains her terminology, on p. 15: “2/2 diamond twill is a 2/2 twill in which the weave is reversed in both systems. Like the chevron/broken twills, diamond twills are found both with point-repeat and with displacement. Normally, the term is used of fabrics with point repeat, whereas ‘broken diamond twill’ is used of fabrics with displacement. As diamond twills with point-repeat are exceedingly rare in North European prehistory, the term ‘diamond twill’ is here used for broken diamond twill only (fig. 1l). For diamond twills with point-repeat, the term ‘lozenge twill’ is used instead (fig. 1k).” If you’re lost already, don’t despair; these terms will be explained and illustrated below.

To avoid ambiguity, I will use “lozenge twill” to describe this family of weave structures, and I’ll reserve “diamond” for the actual diamond pattern in the cloth, regardless of the method by which it was woven.

Understanding the weave graphs

Throughout this report, weave graphs are used to illustrate certain points. These boxes of tiny black and white squares are a commonly used graphic shorthand for describing the weave structure of cloth. Weaving has two “systems” of thread, arranged perpendicular to each other, called warp and weft. The warp is under tension and is arranged first on the loom. The weft is the thread that is carried back and forth on the shuttle. A weave graph shows how the two systems interlock, in terms of travelling over and under each other. A white square indicates a thread intersection where the weft travels over the warp, and likewise, the warp is travelling under the weft. A black square shows a thread intersection where the weft travels under the warp, which means that the warp thread is traveling over. If you want to follow the path of a weft thread, you would look at a horizontal row in the graph. For instance, in fig. 1a, the top row tells you that the weft thread starts under, then goes over, and continues like that - you would say, “under, over, under, over.” If you want to follow a warp thread, remember that a black square means that the warp is on top. So reading down the first column of fig. 1a, you would see that the warp thread is traveling “over, under, over, under.” All of this sounds complicated, but with a little practice, you can glance at one of these graphs and recognize the weave type immediately.

Although the graph is shown in two colors to indicate the weave structure, note that the threads of warp and weft can be, and frequently are, the same color. These graphs are not intended to indicate two-color cloth.

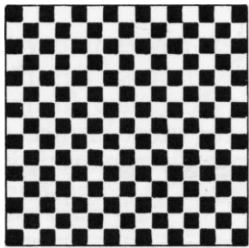


Fig. 1a

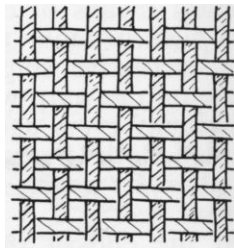


Fig. 1b

Here’s a weave graph (Fig. 1a) of the type of cloth called “tabby.” It’s the sort of weave you’d find on a bedsheet, a simple grid of “over, under, over, under.” The weave graph for tabby has a characteristic checkerboard pattern. An illustration of the cloth structure is adjacent (Fig. 1b), for comparison, to help you visualize the “over, under” path.

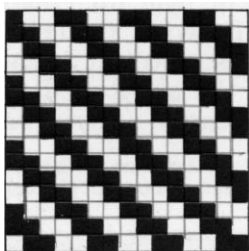


Fig. 2a

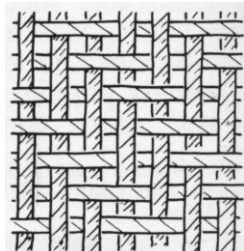


Fig. 2b

Here’s a weave graph (Fig. 2a) of a 2/2 twill. Note that the weave pattern goes “over, over, under, under” and repeats. This is true for warp and weft. Because each row is offset by one, there is a diagonal gradient to the pattern. This diagonal characteristic is visible on the surface of plain 2/2 twill. (The direction of “slant” is arbitrary; it could just as easily be woven with the slant in the opposite direction, as in Fig. 3a.)

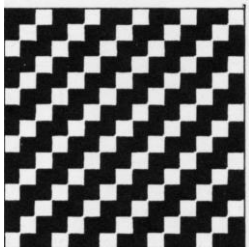


Fig. 3a

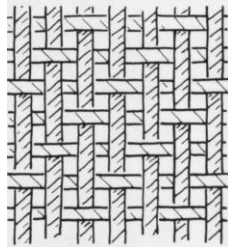


Fig. 3b

And finally, here’s a weave graph (Fig. 3a) of a 2/1 twill. In this type of cloth, the weave pattern goes “over, under, under” and repeats. With twice as many unders as overs, the graph has twice as many black squares as white ones. If you were to turn the fabric over, the weave pattern would look like: “under, over, over.” The weave graph for that side would have twice as many white squares as black ones.

Lozenge Twills

The diamond patterns can be woven as a variant of 2/1 twill or 2/2 twill. Sometimes, 2/1 is called “three end twill” and 2/2 is called “four end twill.” 2/2 is much more common in pre-1000 AD northern Europe, (for example, in the Birka graves), but 2/1 is also known. 2/1 becomes more common in the 1100s and beyond. How can you tell what you’ve got if you’re not a fiber geek? Well, get out your magnifying glass!

2/2 Broken Lozenge Twill

In a 2/2 broken (or, less commonly, “displaced”) lozenge twill, mostly, the threads will travel over two and under two threads. However, only along the central vertical and horizontal axis of the diamond, you will see over-two/under-two alternating with over-two/under-ones. Note that in this weave, the maximum float (the number of threads crossed over) is two threads. You will never see a thread float over or under three or more threads in 2/2 broken lozenge twill.

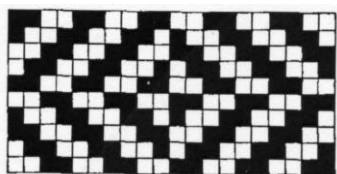


Fig. 4a

In Fig. 4a, the exact center of the diamond has the threads going over two, under two. This is the most common variant of 2/2 broken lozenge twills.

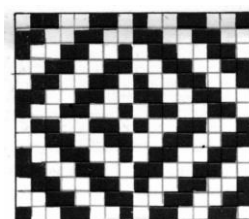


Fig. 4b

In Fig. 4b, the exact center of the diamond has the threads going over two, under one, over one, under two. This is less typical of 2/2 broken lozenge twills, but it does occur before 1000 AD.

2/2 Point-Repeat Lozenge Twill

In a 2/2 point-repeat (also called “non-broken” or “accurate-meeting”) lozenge twill, mostly, the threads will travel over two and under two threads. In the center of the diamonds, and at certain points along the vertical central axis, you will see an occasional over-three float.

In Fig. 5, you can see that the meeting points of the peaks are symmetrical, or a mirror image of each other. There is no displacement or jump along the axes, as there is in the “broken” style. This type of cloth is very rare in early northern Europe; the only example I have yet come across is from Viking-Age Dublin (see the Catalog of Examples.)

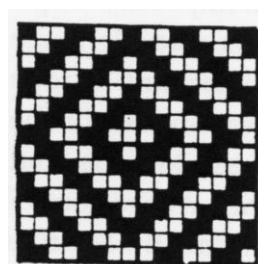


Fig. 5

2/2 “Atypical” Lozenge Twill

A few known historical examples of 2/2 lozenge twill are atypical, in that one system is “broken” and the other isn’t. In fig. 6, the “break” or displacement occurs across the vertical axis, while the horizontal axis is point-repeat. None of these are from the Viking Age; one is very early, from Roman Mainz, and one is from the 14th-C finds in Greenland.

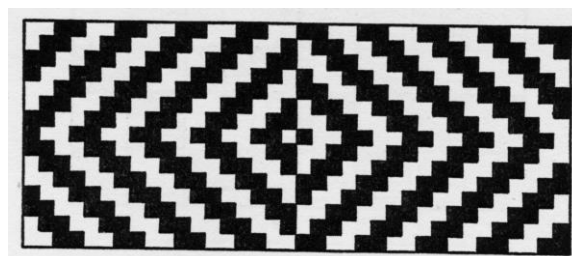


Fig. 6

Lozenge Twills, continued

2/1 Lozenge Twill

In a 2/1 lozenge twill, mostly, the threads will go over two and under one, or over one and under two. However, check the center of the diamonds closely. In or near the center, and occasionally along the vertical central axis, you will see a float over or under three threads. There should be no float longer than three threads. In this type of lozenge twill, there is no distinction between “broken” and “point-repeat.” All 2/1 lozenge twills are point-repeat.

Fig. 7a

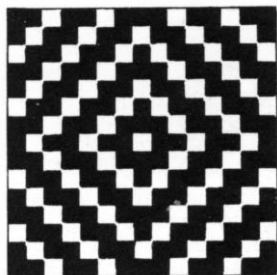


Fig. 7a shows a 2/1 lozenge twill where the center is a single dot. The rows immediately above and below this center point have floats of three.

Fig. 7b

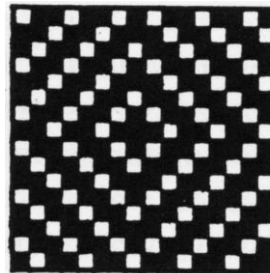


Fig. 7b is also a 2/1 lozenge twill, but the center of the diamond consists of a three-square float. Both variants are known.

What Makes it “Broken”?

The diamond pattern on the woven cloth can be divided into four quadrants by drawing a vertical and a horizontal line through the center of the diamond. How the threads meet up, across these dividing lines, determines whether the pattern is broken or point-repeat. If you study the overall effect of Figs. 4a and 4b, which are broken, and compare them with Fig. 5, which is point-repeat, the difference should be obvious. Broken patterns aren't an exact reflection across the axes of symmetry, while the point-repeat patterns are.

The terminology here can also be confusing, because different writers use different synonyms. “Broken” is the most common term, but synonyms include “asymmetric,” “displaced,” “non-point-repeat,” or “uneven-meet.” The alternative non-broken weave is also called “symmetric,” “point-repeat,” or “even-meet.”

A Note About Bird's-Eye Twill

The term “bird's-eye twill” is used loosely by modern weavers to indicate any of various weave structures that produce a diamond shape or texture on the cloth. Figs. 5, 7a, and 7b might all be called bird's-eye twills, as are some other weave types not illustrated here. Until you've examined it closely, do not assume that a “bird's-eye” is a close match for the historical type of weave you are seeking.

Colors

Modern folk weavers usually weave their lozenge twills or “bird’s-eyes” with one color in the warp and another in the weft. This has the advantage of showing off the diamond structure more clearly. Dye analysis of the fine Sutton Hoo lozenge twills (early 7th century) indicates that were probably woven this way (see details in the Catalog of Examples which follows.) Many extant examples of lozenge twill from early northern Europe either haven’t been, or can’t be, tested for the presence of dyes, so it is currently not possible to state the ratio of two-color vs. one-color lozenge-twill cloth. However, a number of examples do seem to be monochrome. Monochrome lozenge twills are quite lovely in their subtlety. The diamond pattern is clearly visible as light strikes the fabric. (This same sort of subtle, monochromatic patterning was apparently esteemed; it is seen in the late 9th-C or 10th-C ecclesiastical tablet-woven band from Augsburg, Germany, depicted in Collingwood’s *Techniques of Tablet Weaving*, Plate 77.)

Spin Directions: S and Z

Loose fibers are spun together to make long, strong, compact threads. Using spun threads rather than loose fibers has obvious advantages for the weaving process. Most fibers during this time were spun on a drop-spindle. Fibers can be spun in one of two directions: S or Z. Fig. 8 illustrates an easy mnemonic to remember spin direction. Conveniently, if you turn the thread top-to-bottom, the spin direction stays the same. Textile archaeologists place a great deal of importance on spin-directions, because this variable can sometimes indicate a place of origin for the cloth. (If you want to know more about this, Bender-Jorgensen’s *North European Textiles Until AD 1000* is the best source currently.)

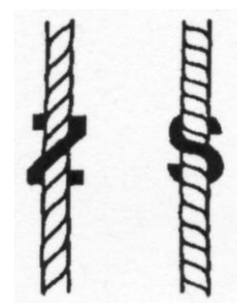
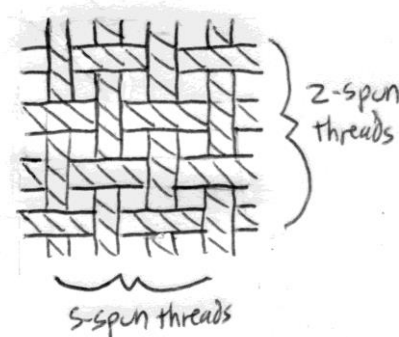


Fig. 8

A right-handed person, using a drop-spindle, will naturally turn the spindle clockwise, which results in a Z-spun fiber. However, it’s not at all difficult to learn to turn the spindle in the opposite direction, counterclockwise, giving the fiber an S-spin.

In the Viking Age, and in many other historical eras before the advent of the spinning wheel, threads were often spun in either direction, according to the needs of the weaver. In some of the Viking-Age 2/2 broken lozenge twills, such as those found at Birka, the warp and weft were both Z-spun; this is called Z/Z cloth. In other examples, particularly from Saxon times, the warp was Z-spun and the weft was S-spun. This is sometimes called Z/S cloth (the warp is always mentioned first.) When the warp and weft are of differing spin-directions, the surface of the cloth is exceptionally smooth. This holds true for diamond twills as well as for plain twills and tabbies. Fig. 9 shows a tabby-woven cloth with S-spun threads in one system and Z-spun threads in the other. The twists align and give a uniform texture to the cloth.



Worsted

Worsted wool is generally prepared from longer wool fibers, and it has been combed to exclude any short, fuzzy fibers. The prepared fiber is then spun a bit more tightly than usual. This preparation makes a smoother, firmer thread that enhances any surface patterns that are woven in. The Birka lozenge twills, and many other pre-1000 AD woolen fabrics, were made of worsted wool.

Setts (Thread Counts)

The sett of a cloth is a way to measure the fineness or coarseness of the cloth. The sett is measured by counting the number of threads per unit of measure (inches or centimeters) in the warp and in the weft. By convention, the warp threads are always listed first. Weavers may also refer to warp threads as “ends” and weft threads as “picks.” Be careful to note the system of measurement used. Most textile archaeologists use centimeters, so that is the form of measurement used here. However, modern weavers in the US will measure their setts in threads per inch.

If you want to check the sett on a piece of cloth yourself, first use a ruler to place two pins, one centimeter apart, with the ruler held perpendicular to the selvages (the tightly-woven edges) of your cloth. Then count the number of threads between those pins. That’s your warp or “end” count. To count the wefts or “picks,” again place two pins, one centimeter apart, this time with the ruler arranged parallel to the selvages of the cloth.

Modern handwoven woven cloth tends to be even in the warp and weft, or more densely packed in the weft. European Lozenge twills in the era before 1000 AD were either fairly even in warp and weft, or much higher in the warp, with the warp of the Birka twills being sometimes three times as dense as the weft per cm.

Pattern Repeats

In woven lozenge twill, the lozenges can be large or small, or, to look at it another way, the diamond centers can be close together or far apart, horizontally and/or vertically. In modern times, we have a strong preference for making the diamonds of the same size, both vertically and horizontally. However, in our period of interest, this was not always the case, and there are numerous examples of irregularly executed patterns. Hald provides an example on p. 150 of *Ancient Danish Textiles from Bogs and Burials*, which is reproduced in Fig. 10. She doesn’t state where this particular pattern was found. Also note the irregularities in the fine woven cloth from Sutton Hoo, reproduced in Fig. 13.

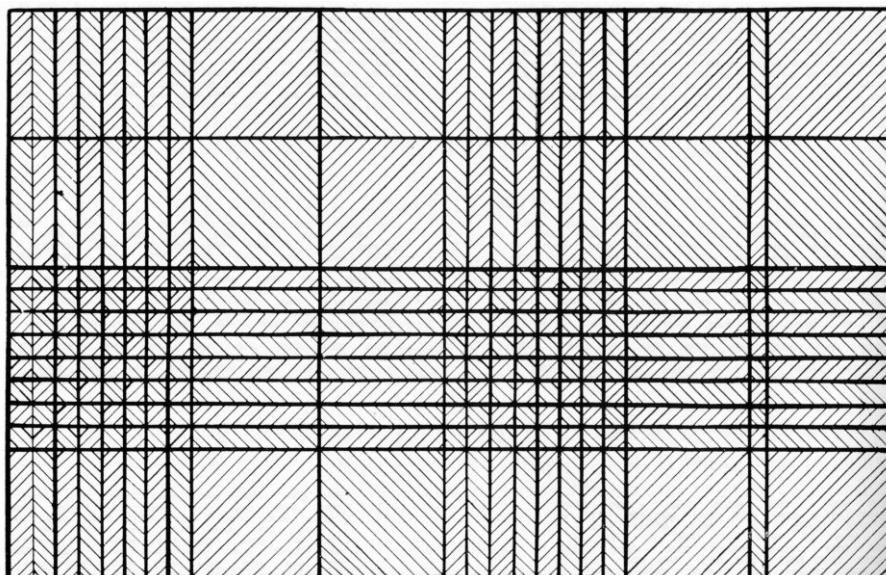


Fig. 10

Pattern repeats are mentioned, when known, in the catalog at the end of this report. Pattern repeats are listed with the warp threads first (called “ends”) followed by the weft threads (“picks.”) Pattern repeats are highly variable, even within a specific cultural and temporal context.

Loom Drafts for Weaving Two Versions of 2/2 Broken Lozenge Twill

These weaving drafts were devised by Barbara Broughton-West and published in Issue 106 (1993) of *Tournaments Illuminated*. The article is "Weaving Medieval Fabric: Wool Diamond Twills from the First to the Twelfth Centuries in Europe." She gives excellent practical advice for weavers, as well as numerous historical examples.

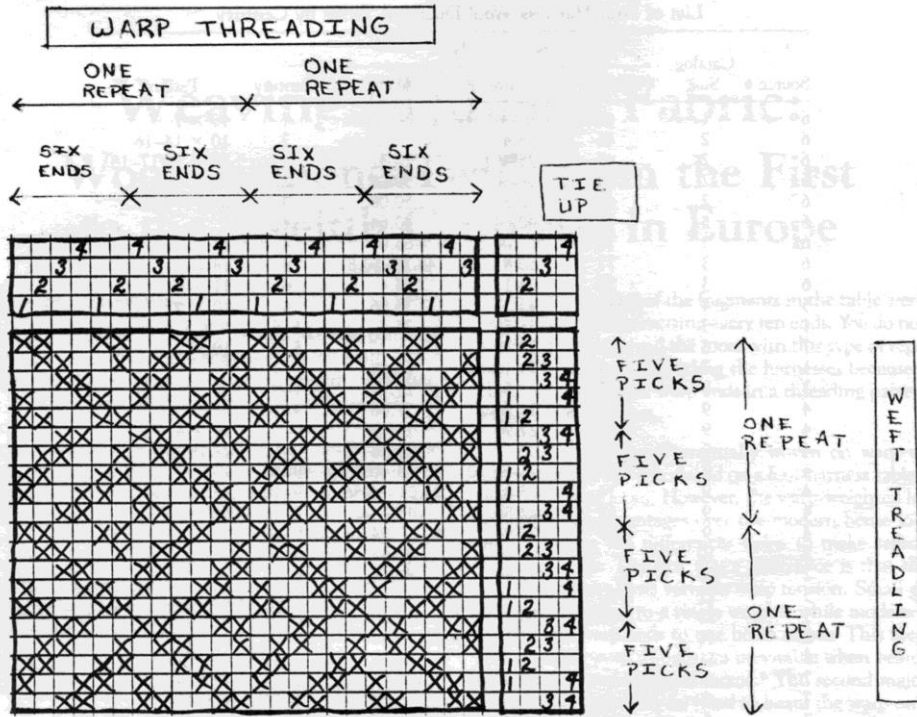


Fig. 11

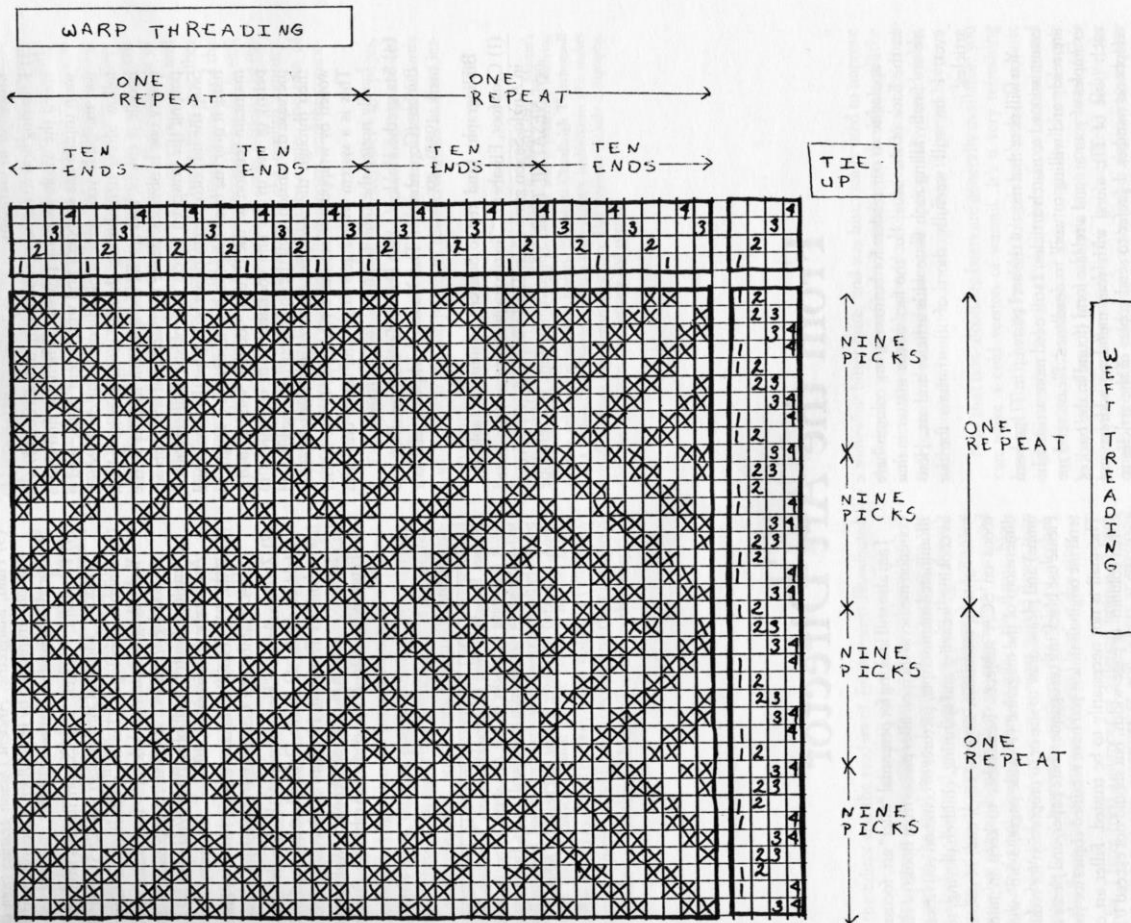


Fig. 12

Catalog of pre-1100 Northern European Examples of Lozenge Twill

2/2 Broken Lozenge Colored Cloth from Karlby Mose, Denmark, late Bronze Age, or early Iron Age

This early example of broken lozenge twill wool is interesting because it is woven in two colors, but it's not a case of the warp being one color and the weft being another. In this example, both the warp and the weft threads are arranged in stripes of two alternating colors in varying widths, giving an **overall "plaid"** appearance to the fabric which is not correlated to the size of the diamonds. The pattern repeat is 40 ends, 10 picks. The threads are S-spun in both directions, and the sett is 10 ends, 9 picks/cm. (Hald, *Ancient Danish Textiles from Bogs and Burials*, p. 45-47, and Fig. 141 on p. 153.)

2/2 Broken Lozenge from Roman Sites in Britain

2/2 broken lozenge twill wool was found at several locations in Roman Britain. Corbridge, on Hadrian's wall, had two examples. One was S/S spun example with a sett of 10 ends, 9 picks/cm; the other was Z/S spun with a similar sett. Verulamium's example was much finer, with a sett of 20 ends, 20 picks/cm, Z/S spun. (Wild, *Textile Manufacture in the Northern Roman Provinces*, p. 98-99.)

2/2 Atypical Lozenge Twills from Early Roman Mainz

An early Roman site in Mainz, Germany, yielded some examples of standard 2/2 broken lozenge twill wool, but two pieces were anomalous. These were broken in one direction and point-repeat in the other, as shown in Fig. 6. One is Z/S spun, with a sett of 26 ends, 26 picks/cm, and a pattern repeat of 24 ends, 46 picks. The second is also Z/S spun, with a sett of 15 ends, 10 picks/cm, and a pattern repeat of 36 ends, 16 picks. (Wild, *Textile Manufacture in the Northern Roman Provinces*, p. 116)

2/2 Broken Lozenge from Hjorring Praestegaards Mark, Denmark, 200-300 AD.

This barrow yielded two very fine examples of lozenge twill, with S-spun thread in one direction and Z-spun in the other. On one, the sett is 20 ends, 22 picks/cm; on the other it is 14 ends, 15 picks/cm. In both cases, the **monochrome** pattern is broken into very wide and very narrow texture strips in warp and weft, making the diamonds irregularly spaced. Hald says, "In this way the pattern makes squares interchanging with narrower stripes, the effect is not unlike a modern damask." In one cloth, the center is over two, under two, as in fig. 4a, but in the other it's over one, under one, as in fig. 4b. (Hald, *Ancient Danish Textiles from Bogs and Burials* p. 86-7, Fig. 70 on p. 89, and fig. 72 on p. 90).

2/2 Broken Lozenge in Migration-Era Trousers from Damendorf and Thorsbjerg, ca. 200-300 AD

The Iron-Age trousers from the Damendorf bog were recently re-examined and restored. The weave was 2/2 broken lozenge twill wool, with Z-spun warp and S-spun weft. The sett was 12-14 ends, 11-12 picks/cm. with a pattern repeat of 20 ends, 18 picks. The center of the diamonds was over two, under two, as in fig. 4a. (See Farke, p. 74-5). The Thorsbjerg trousers are also broken-lozenge twill wool. I have not found any indication that these garments were woven with dyed thread. (Owen-Crocker, *Dress in Anglo-Saxon England*, p. 116)

2/2 Broken Lozenge from Near Vejen, Denmark (probably Migration Period, 300-400 AD)

A fairly large piece of wool cloth in broken lozenge twill, about two yards long and one and a half yards wide, was found in a bog northwest of Vejen, Denmark. All four edges have tablet-woven borders. The warp is Z-spun, the weft is S-spun. The sett comes to about 13 ends and picks/cm. Hald's illustration of this cloth shows that it's regularly woven. The pattern repeat is 20 ends, 11 picks. The centers are over two, under two, as in Fig. 4a. Certain details indicate that it is from the Migration Period, ca. 300-400 AD. (Hald, *Ancient Danish Textiles from Bogs and Burials*, p. 66-68)

2/2 Broken Lozenge from the Broomfield Barrow (early Saxon)

In this barrow, a broken diamond 2/2 twill of wool, spun Z/S, was found. The warp and weft were of different colors, with **one system dyed** and the other left natural. The sett is 20-24 ends, 17-20 picks/cm. (Crowfoot, "The Textiles" in *Sutton Hoo Ship Burial*, p. 468)

2/2 Broken Lozenge (4 examples) from Sutton Hoo (early Saxon England, East Anglia, ca. 625 AD)

Four examples of 2/2 broken lozenge twill were found in the Sutton Hoo burial.

The first was of Z/S spun thread, and possibly dyed, but no further details are available. It is woven from exceptionally fine worsted wool, and very regularly, with a sett of 35-38 ends, 20-26 picks/cm.

The second and third, of Z/S spun wool thread, were somewhat irregularly woven, with some extended areas of chevron. The sett is 17-19 ends, 13-15 picks/cm. Although they were first thought to be from the same piece of cloth, they probably represent two different but similar pieces of fabric. Dye analysis revealed some indication of **differing colors** in warp and weft. One of the pieces had perhaps a darker blue warp and a lighter blue weft, while the other had undyed warp and red weft. One of these is illustrated on the next page, fig. 13.

The fourth piece was of **linen**, with S/Z.spun threads. The sett was 21-22 ends, 15-17 picks/cm. It appears to be undyed. Crowfoot mentions that other examples of linen 2/2 broken lozenge twill are known from early Saxon England. (Crowfoot, "The Textiles" in *Sutton Hoo Ship Burial*, p. 422-24)

2/2 Broken Lozenge from Morken, a Frankish Deposit in Germany, 5th to 7th C.

This find included a 2/2 broken lozenge twill in **silk** with blue yarn in one system and white in the other. Other details are not available. This is considered to be a Mediterranean import. (Crowfoot, "The Textiles" in *Sutton Hoo Ship Burial*, p. 424.)

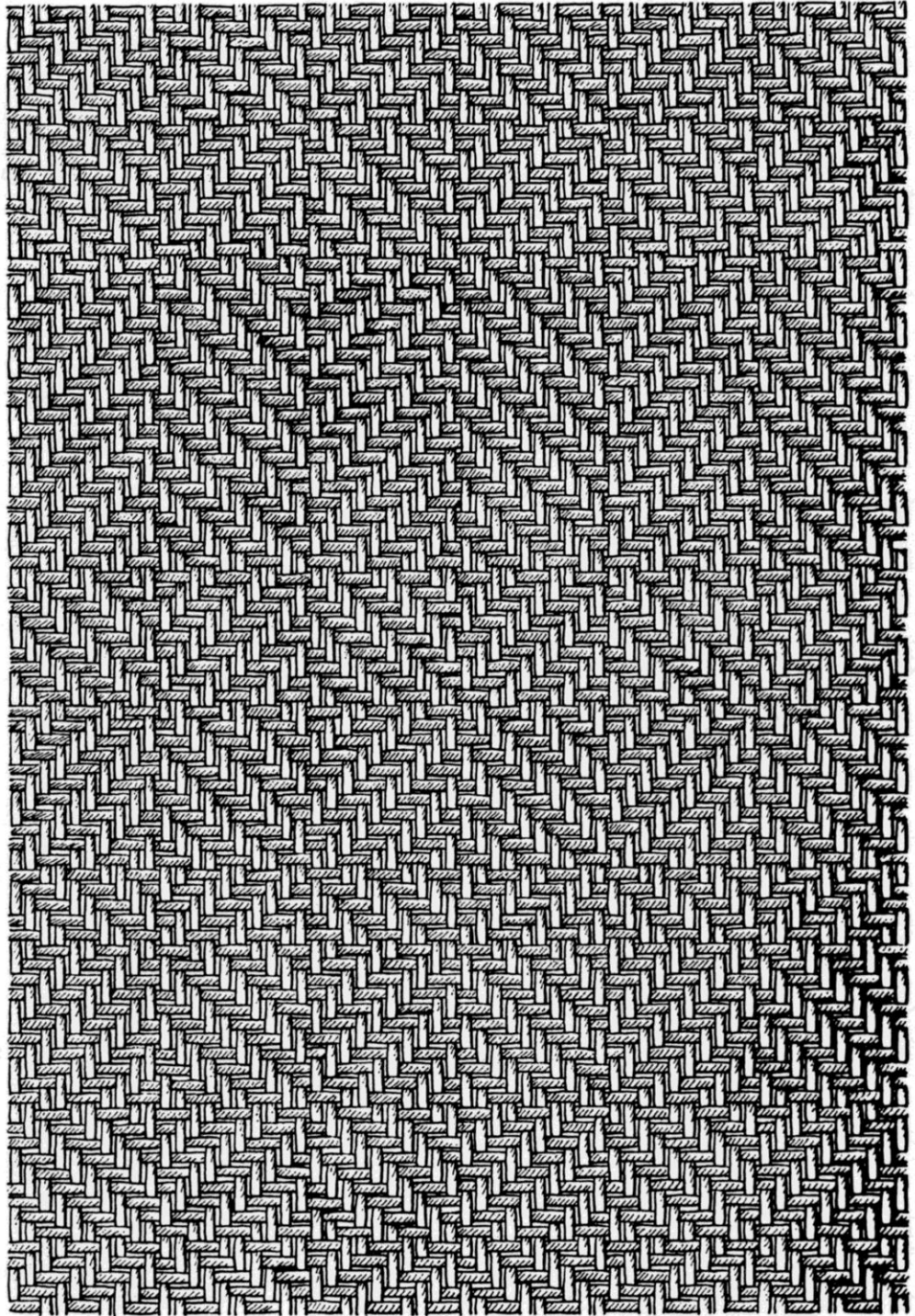
2/2 Broken Lozenge and 2/1 Lozenge Twill from Birka, Sweden, and other Viking-Age sites, 800-950 AD

Roughly 40 examples of 2/2 worsted broken lozenge twill, spun Z/Z, were found in the Birka graves. Here are some typical setts (ends first):: 32x12/cm, 38x16/cm, 40x18/cm, and up to 55x21/cm for a particularly fine cloth. Geijer notes that the warp is invariably twice or more as dense as the weft, and this is true not only at Birka, but also at Kaupang and Oseberg.

The 2/2 broken lozenge twill wools found at Kaupang, Hamaroy, Spanga and Valbo are coarser, with a typical sett of 20 ends, 10 picks/cm. In western Norway, this type of cloth is found in more than a third of extant burials, 38 out of 103 graves, according to Bender Jorgensen ("Viking Burial from Kneep," p. 167-8)

Birka had a few rare examples of 2/1 lozenge twill wools. They were very fine cloth, with setts of 50x17/cm, 52x14/cm, and 55-60x17/cm. (Geijer, *History of Textile Art*, p. 71).

Note extra chevrons in
this area.



The pattern here is also
slightly irregular.

Fig. 13

Fig. 13 shows one of the fine 2/2 broken-lozenge twills from Sutton Hoo. Note the irregularities.

2/2 Broken Lozenge in 10th-Century Viking-Style Burial at Kneep on the Isle of Lewis, Scotland

A tenth-century Viking woman's burial was found at Kneep on the Isle of Lewis, Scotland. Although no lozenge twills were found in association with the tortoise brooches, there was an impression of fine broken lozenge twill worsted cloth left on the bronze belt buckle. The spin direction of the threads could not be determined. The sett is 32 ends, 16 picks/cm., which shows the typical Viking-age pattern of having twice as many warp threads as weft threads per cm. The pattern repeat was 20 ends, 10 picks. The diamond has an over two, under two center, as in fig. 4a. Jorgensen suggests that this particular example of lozenge twill was not, perhaps, worn by the woman, but was instead an impression of the mold-lining cloth used by the belt-buckle smith. Being an impression, no dye analysis is possible. (Bender-Jorgensen, "Viking Burial from Kneep," p. 166-8)

2/2 Broken Lozenge Twills among the Anglo-Scandinavian Textiles found at Coppergate, York, England

Of the wool textiles found in the Anglo-Scandinavian site at 16-22 Coppergate, York, there were 13 tabbies, six 2/2 twills, seven 2/2 chevron twills, and six 2/2 lozenge twills. Almost all have a Z-spun warp and an S-spun weft, and are of coarse to medium in quality. Walton states, "There are none of the fine Z/Z diamond twills of the type found at Birka and other Viking-Age sites in Scandinavia." (p. 63).

Walton cites one of the broken-lozenge twills as being probably locally made, since very similar examples have been found at other locations in York. This broken-lozenge style has a **small repeat**, with 12 ends, 10 picks. A weaving draft for this pattern is provided in Fig. 11. The sett was 15 ends, 12 picks/cm. The centers of the diamonds are over two/under two, as shown in Fig. 4a. (Walton, "Textile Production at Coppergate," p. 63-4).

2/2 Broken Lozenge and 2/1 Lozenge from Late Saxon Textiles from London

Several 2/2 broken lozenge twills of wool were dated to the late 9th to 10th centuries. All are Z/S spun. Setts range from 9-14 ends, 6-14 picks/cm. (Pritchard calls these medium quality). Some were dyed, but no distinction could be found in the colors of warp and weft.

Two pieces were woven very regularly, with a pattern repeat of 20 ends, 18 picks. However, another piece had diamonds that were consistently 20 threads high, but the width varied in an irregular manner. Yet another piece had diamonds with completely irregular spacing.

Two 2/1 lozenge twills of wool were found, dated to the late 11th or 12th centuries. One was Z/Z spun with a sett of 22 ends, 14 picks/cm. It was dyed with indigo and madder to produce a purplish color. No complete pattern unit remains to measure the size of the pattern. The other piece found was Z/S spun with a sett of 28 ends, 19 picks/cm, no detectable dye, and a pattern repeat of 22 ends, 9-12 picks. (Pritchard, "Late Saxon Textiles from the City of London," p. 54-57, nos. 28 and 29.

2/2 Broken and Point-Repeat Lozenge Twills, and 2/1 Lozenge from Dublin, Ireland, 917-1169 AD

Pritchard studied fabric from Dublin, covering the years 917-1169, spanning occupations by the Vikings and the Normans. Within this large range, it is not surprising to find a wide variety of cloth types. She does not give any more precise dates for the fabric she describes in this article. All of the examples are of wool cloth.

Pritchard notes several 2/2 broken lozenge twills of wool, some spun Z/Z and some Z/S. One has a pattern repeat 28 ends and an irregular number of picks. Another is very regular, with a sett of 28 ends, 18 picks. She doesn't mention any dye results on these cloths, though other fabrics from this find have shown traces of color.

Several of the 2/2 lozenge twills from Dublin are **point-repeat**; these have the characteristic over-three floats, as shown in Fig.5. Pritchard suggests these may be closely related to the 2/1 lozenge twills.

Of the 2/1 twills, one was dyed with yellow. The coarsest of the 2/1 lozenge twills has a sett of 20 ends, 8-10 picks/cm, and the finest is 50 ends, 22 picks/cm. Pritchard notes, "the size of the lozenges shows great diversity and clearly weavers had the freedom to vary pattern units." Spin directions of the threads is also variable. (Pritchard, "Aspects of the Wool Textiles," p. 93-98.)

Overview and Conclusions

The earliest 2/2 broken lozenge twill is known from the Bronze Age, found at Gerum, Sweden. (Wild, *Textile Manufacture*, p. 48) This style of decorative weaving was appreciated by the Romans in Britain, and by the early Saxons in East Anglia, as seen in the Sutton Hoo burial. The Migration-Age Scandinavians in Denmark found it an appealing cloth, as it was used in the Damendorf and Thorsbjerg trousers. Broken lozenge twill was exceedingly popular in western Scandinavia during the Viking Age, and was also common in other Scandinavian-settled areas, such as York. Wild, in *Textiles in Archaeology*, states that 2/2 broken lozenge twill came into fashion in northern Europe in the pre-Roman Iron Age, and remained preeminent for the next millennium (p. 41).

The later Saxon textile fragments from London, examined by Walton, and the mixed Viking/Norman finds from Dublin which Pritchard has published, included both 2/2 and 2/1 lozenge twills. Jorgensen (*North European Textiles*, p. 150) speculates that this shift to 2/1 twill may be an indication of the coming of the horizontal loom, although it is also possible to weave 2/1 twill on a warp-weighted loom. Towards the end of the 11th century, 2/1 lozenge twills became the predominant type of diamond-pattern weave in Northern Europe.

Classic 2/2 broken lozenge twill is "broken" in both directions. A very few examples of atypical lozenge twills have been found, where one direction is broken and one is not. Two examples are cited by Wild from early Roman-Age Mainz (*Textile Manufacture*, p. 116), and another example is found in fourteenth-century Greenland (Ostergard, p. 71).

Although classic 2/2 broken lozenge twill is the predominant lozenge weave in Northern Europe before 1000 AD, two examples of 2/2 point-repeat lozenge twill have been found in Viking or Norman Dublin. (Pritchard p. 94)

Moving to 2/1 lozenge twill, early examples of this weave do exist. John-Peter Wild does not know of any 2/1 lozenge twills from the Roman textiles found in Northern Europe, but he does mention that the Alamanni of South Germany were weaving 2/1 lozenge twills during this time. (Wild, *Textile Manufacture*, p. 50) 2/1 lozenge twill has been found at Birka, but is not at all common during the Viking Age. The question of whether 2/1 lozenge twills were imported or locally produced at that time remains a thorny one.

J. P. Wild believes that the late Vikings or late Saxons introduced the 2/1 lozenge twill into England, after which it became the principal luxury product of English weavers in the 12th and 13th centuries. (p. 43).

2/1 lozenge twill has been found as late as the fourteenth century, from a burial in Devon, England (Ostergard, p. 69).

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