Introduction

Hand combs or wool combs (*ullkam*) were an essential and common part of the Viking Age processing of fleece. The tools were known from at least the early Iron Age in Scandinavia, and are still being produced today with very little change in design.

Traditionally, two combs are used to rake a section of fleece from one comb to the second. Single pitch hand combs have one row of tines and are used to remove vegetable matter and prepare the fibre for sorting. Double pitch hand combs have two rows of tines and are used to separate the * tog from the *pel, remove weak fibres, knots, remaining vegetable matter and any other imperfections in the raw wool.

Wool combs are designed to be used in tandem to release and manage greasy woollen fibres. One comb is dressed with a sufficient number of locks. This comb is stationary as the second comb, the working comb, is used to rake the fibre over and over, transferring the majority of the wool from the stationary comb to the comb in motion.

Once the working comb is full, the comb is rotated on its axis and the fiber is raked through the stationary comb again. The knots and imperfections remain behind the tines to be discarded or used for other purposes.

The goal of this guide is to provide information on the physical and written evidence of these combs, to provide instructions on the creation of a pair of wool combs indicative of the style used in period, and where practical to use period tools and materials in the creation of the combs.

The primary goal is that this project should be cheap enough and easy enough for others to replicate as part of their own living history journey.
Research

Existence and Use of Wool Combs

Literature Evidence

The most prominent example of a wool comb being mentioned in the Icelandic sagas is from Grettis saga, in which Grettir attacks his father Asmundar with one.

Now Grettir sees where, in one of the seats stood wool-combs: one of these he caught up, and let it go all down Asmund’s back. He sprang up, and was mad wroth thereat; and was going to smite Grettir with his staff, but he ran off. Then came the housewife, and


Physical Evidence

Wool combs, both with and without metal binding plates, have been recovered in quantity from the early Iron Age and through the Viking Age.

Despite being a common find, the misreporting of wool combs as simply ‘nails’ following the wood body decaying and disintegrating has resulted in some potentially misleading conclusions circulating.

To illustrate further the earlier statement about the tines being regularly confused for nails in finds, and how this can happen, below are images of loose tines that were identified as being from wool combs. It seems like an easy mistake to make.

While the inclusion of binding plates (above) has given us some of the clearest evidence of the form and function of wool combs from period, this should not be seen as the only, or even the most common process of manufacture in period.

A clear example of tines set into wooden handles that exist from period are an early Iron Age pair of single pitch combs from Hyrt farm in Hordeland, Norway. 20 iron tines, 11cm in length, were set into each handle.
Research (cont.)

Both curved and straight tines seem to have been common in period.

Materials

Pine

Cheap, good to work with, locally available and abundant in period.

The cost of pine has been included in this budget as it was purchased for this project, however it would be possible to do this with scrap timber, or to make several sets of combs from one length of purchased pine.

Steel

Although the original combs were usually made with iron tines, steel of varying quality was known in period.

Nails were used for this project as they were the correct dimensions based on the Coppergate find, easy to work with, and cheaper than buying mild steel by the length.

Raw Linseed Oil

Linseed oil is a normal by-product of flax cultivation, which was grown and processed in period in order to produce linen. It is very likely that the oil would have been used to treat timber in period.

Sandpaper

The speculation is that leather either soaked in salt water or in conjunction with loose grit (such as pumice) could have been used to substitute modern sandpaper.

In order to keep this build approachable, a substitution of extremely low grit sandpaper has been used to emulate the effect, followed by a higher grit sandpaper to clean up the surface.

Described as a flax comb, this find is from the Iron Age in Veka, Voss, Hordaland in Norway (NF05408-001)

Due to the included scale, the reproduction combs will be based on the combs known as Coppergate 2273 (below), without the binding plate. The binding plate has been left out in order to have them more closely resemble what was likely the most common design for wool combs in period.

A binding plate could easily be constructed from a relatively thin sheet metal if desired.

The tines appear to be between 3 and 5 mm wide. Other measurements extrapolated can be found in the Construction section of this documentation.
Research (cont.)

Budget

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Paslode 100 x 3.75mm 500g Bright Steel</td>
<td>$6.30</td>
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<tr>
<td>Bullet Head Nails 50 Pack</td>
<td></td>
</tr>
<tr>
<td>Claymark 140 x 19mm x 1.2m Premium Grade Dressed Pine Sheet</td>
<td>$10.50</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$16.80</strong></td>
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Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chisel</td>
<td>Mästermyr Chest Catalogue #83</td>
</tr>
<tr>
<td>Rasps &amp; Files</td>
<td>Mästermyr Chest Catalogue #32-35, 37</td>
</tr>
</tbody>
</table>

Note: Although a chisel is specified, any knife or suitably sharp blade may be used.

Hand Drill

<table>
<thead>
<tr>
<th>Tool</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand Drill</td>
<td>Gimlet from York</td>
</tr>
</tbody>
</table>

Note: As detailed in the Construction section of this documentation, I made use of a bench grinder to speed up the process of sharpening the tines. This is a totally optional part of the process, and it can be done entirely with a file.
Construction

The Tines

Nails have been used rather than starting from steel or iron stock for several reasons - they are available at the right size, they are cheaper than buying steel stock by the metre, and they resemble the finished tine.

Although the heads of the tines on Coppergate 2273 were squared, Peterson (1951) makes note of Norwegian combs with rounded heads. For this reason the heads on this build were left rounded. If desired, squaring them off would be a simple matter of hammering down the four sides.

An optional additional step is to blacken the tines by coating them in linseed oil and sitting them in your oven or a camp stove at the highest setting. This process leaves metal with a polymerised oil coating, which helps prevent rust as well as looking quite nice. This step is more important if using a mild steel stock rather than nails, as the mild steel is extremely rust prone.

One thing to keep in mind, though, is that the oil may eventually flake off and get through the fleece you are processing. For this reason I went over the blackened nails with a wire brush and steel wool to remove the coating. The modern looking shiny coating was removed from the nails, and the lanolin in the fleece should be enough to protect the tines from future rust.

After grinding several down by hand, the remainder were ground on a bench grinder for the sake of practicality.

The period method would likely have been some combination of drawing it to a point during the forging process, and then working it by hand with either a file or an abrasive stone. If you don't own a bench grinder, you can sharpen the ends of the nails with a file.
Construction (cont.)

The Comb Body

The first step of the process was to get measurements from the find. The below measurements have been extrapolated using the included scale.

Using these measurements (as well as the addition of a 175mm handle), draw construction lines onto the pine, and marked out the places for the tines. I marked room for 25 tines on each comb, which is what I estimated the original to contain - but you can add more or less, depending on your preferences.

Once they’re marked up, use a spare nail as a simple hole punch to set the spacing of the tines. This is an important step to make sure that all of the tines are spaced correctly in the finished combs.

Using a square to ensure that you’re drilling in a straight line, make a jig from a scrap piece of timber. Every hole drilled should be done with this jig to help ensure that, as much as possible, all of the holes will match. Even if they are off by a degree or two, they will hopefully all be off by the same degree or two.

Very gently and slowly drill the holes using your hand drill. There is a risk of the timber cracking here, which pine is wont to do, but going slow and steady will make it much less likely.

As the nails are 3.75mm and you wanted them to be primarily held in place by themselves in the final comb, use a 3.5mm bit to drill these holes.
Using a coping saw slowly and carefully cut out the combs themselves. This is another scary part of the process which will be made easier by having the control of hand tools rather than a power tool which may catch and split the pine.

The basic construction is now complete, and we just have some finishing touches to add.

Using a needle file widen, the holes on the back sides to counter sink the tine heads.

Using a chisel turn the rectangular handles into cylinders, and then using a rasp and some sandpaper round and smooth all edges.

Apply some coats of linseed oil to the timber. The area around the tines is difficult to get to after the tines are inserted, so applying the finish now prevents having to try and get your fingers in there later.

All that’s left is to insert the tines. The holes should be just tight enough for the tines to be a snug fit but not so tight that you need more than hand pressure to insert them - having to force them with a hammer may put the combs at risk of splitting.

Although the tines should hold themselves in place, you may wish to add a drop of epoxy or a suitable historical glue to stop any future slipping.
Compiled References


Single pitch wool combs from an Iron Age find at Hyrt farm, Norway.


22 iron tines from a Viking Age grave site in Akershus, Ullensaker in Western Norway. (C22519).


Loose iron tines recovered from a Viking Age grave site from Buskerud, Hol in Norway (C25096)


Flax comb from the Iron Age in Veka, Voss, Hordaland in Norway. (NE05408-001)
