Fibre identification in archaeology

EXPLORING THE MIDDLE AGES

How to identify archeological textiles through optical microscopy
What kind of questions can be answered
How to sample correctly and how much is needed

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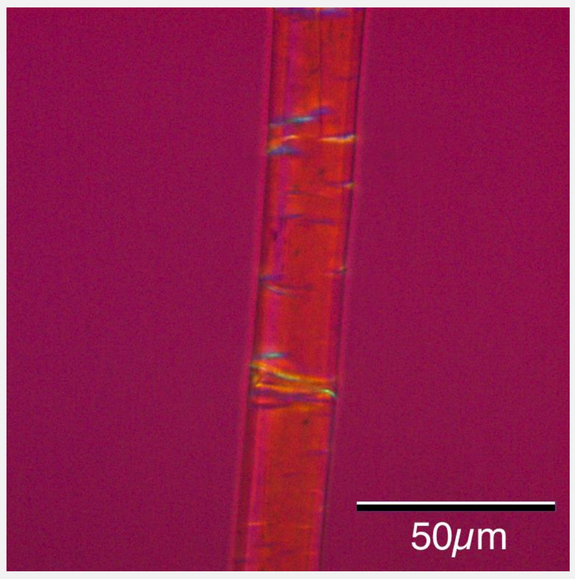


The identification of textile fibres is an important task in archaeology. Animal hair can be distinguished from plant fibres by means of light microscopy.

Closer differentiation of animal and plant species leads to insights such as material use, import or authenticity.

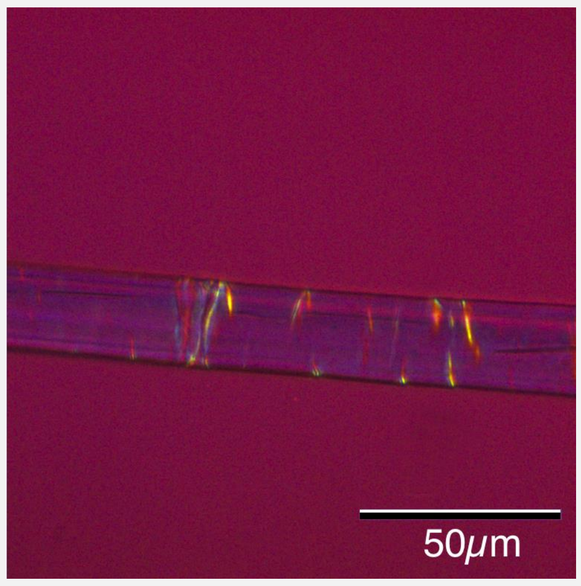
Flax, nettle and hemp are plant fibres found in North European medieval finds.

Cotton, jute and ramie are not domestic and can rather indicate that a studied find is not original.

Animal hair consists of layers of overlapping scales with a characteristic shape, which is one of several morphological signs leading to fibre identification.

Silk has a smooth surface with no structure compared to other types of animal fibres. The presence of silk in North European medieval textiles confirms that they were imported.

Morphological characterization of longitudinal direction and cross section of fibres, behaviour of inner structure in polarized light and micro chemical tests are the determining methods applied.



Above: Result of Herzog test showing blue colour in 0°- position and yellow/red in 90°- position.

This attests to the use of flax/nettle. The morphological character of fibres indicates flax. The sample is from a Viking Age double grave from Hyrt/Voss (B4864_g,h).

Textile fragments were interpreted as remains of a women's shift (undershirt), according to a reconstructed micro-stratigraphy of layers.

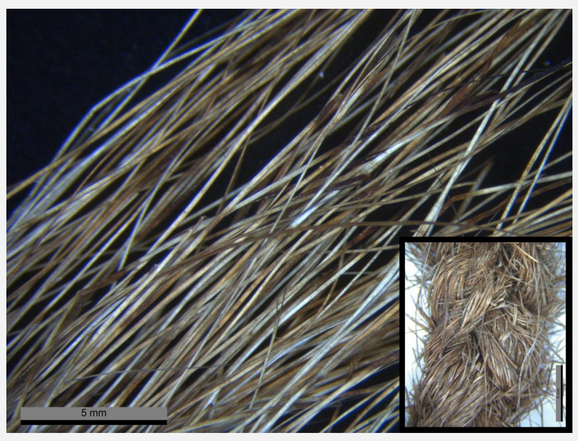
Herzog test

Distinguishing between flax/nettle and hemp can be done by means of a Herzog test. This empirical test, known since 1940, was recently verified and explained theoretically by Einar Haugan and Bodil Holst.

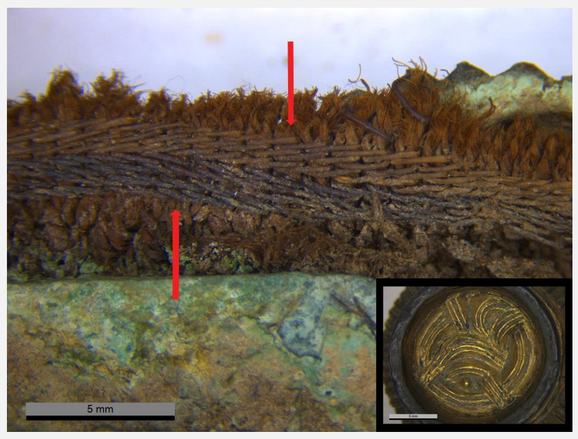
A Video on how to perform the modified Herzog Test

https://youtu.be/sC9GlUKjBDE

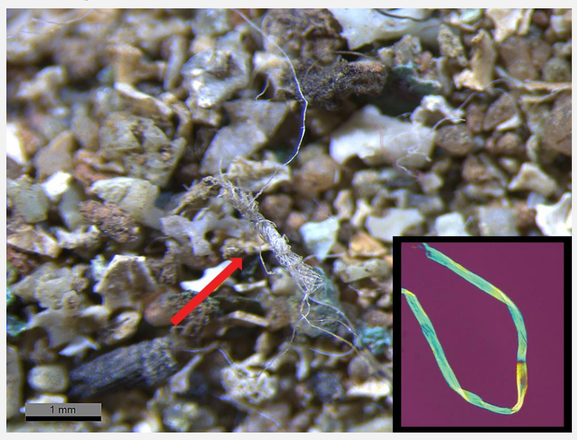
Fragments of original threads have been found on many different objects – an Iron Age urn B_91 containing textile remains.



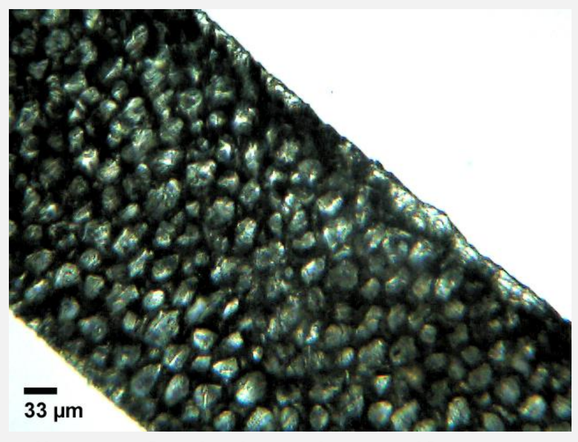
There was a variety of material use; not only sheep wool was used as animal hair for braiding.



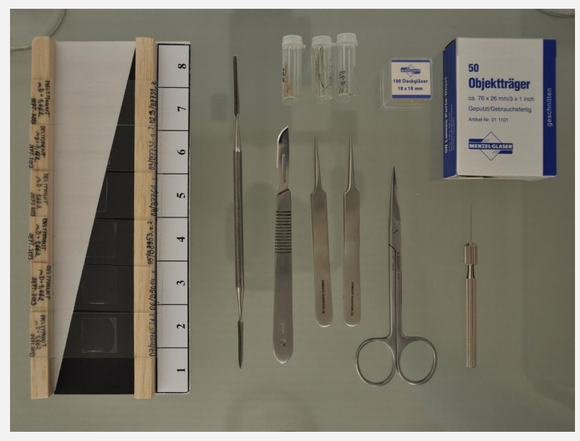
Tablet woven bands from Migration period have been found on cuffs with gilded clasps decorating precious garments. Some bands show patterns in the soumak technique as e.g. the fragment B6092_I_b. It is often cited that "horse hair" was used for this technique, without an analytical verification. Was it really so?



Cotton is a most common pollutant in museum collections. Objects are often contaminated by modern clothing.



Fibres of reindeer (*Rangifer tarandus*) from a fur, dated to the 10th -11th century, were found in the so called Skjoldehamns find (TS 3897).



Sampling process

- Defining of research questions before sampling

- Precise documentation incl. photos of an area to be sampled

- Using clean and appropriate tools (tweezers, tungsten needle, scalpel, surgical scissors) and a reflected light microscope

- Taking as small a sample as possible (less than 1 mg is often enough)

REFERENCES

- Haugan, Einar, and Bodil Holst. "Determining the Fibrillar Orientation of Bast Fibres with Polarized Light Microscopy: The Modified Herzog Test (Red Plate Test) Explained." (2013).
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