

Microscopic analysis

General aspects of optical microscopy, different types of microscopies and usage in cultural heritage samples

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Microscopic analysis

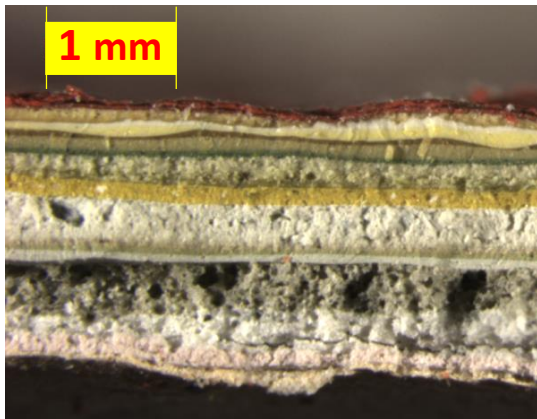
- Often first step of analysis
- Many different microscopes
 - Optical light microscopy
 - Polarized light microscopy
 - Fluorescence microscopy



Obtainable information

- Size and shape of small objects
- Microstructure
- Dimensions
- Some examples:

Paint layers



Textile fibres



Plant remains

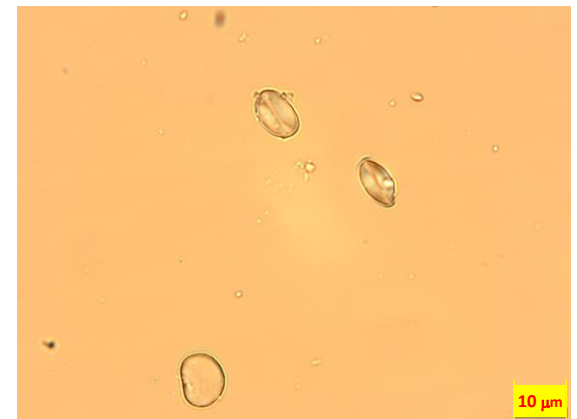
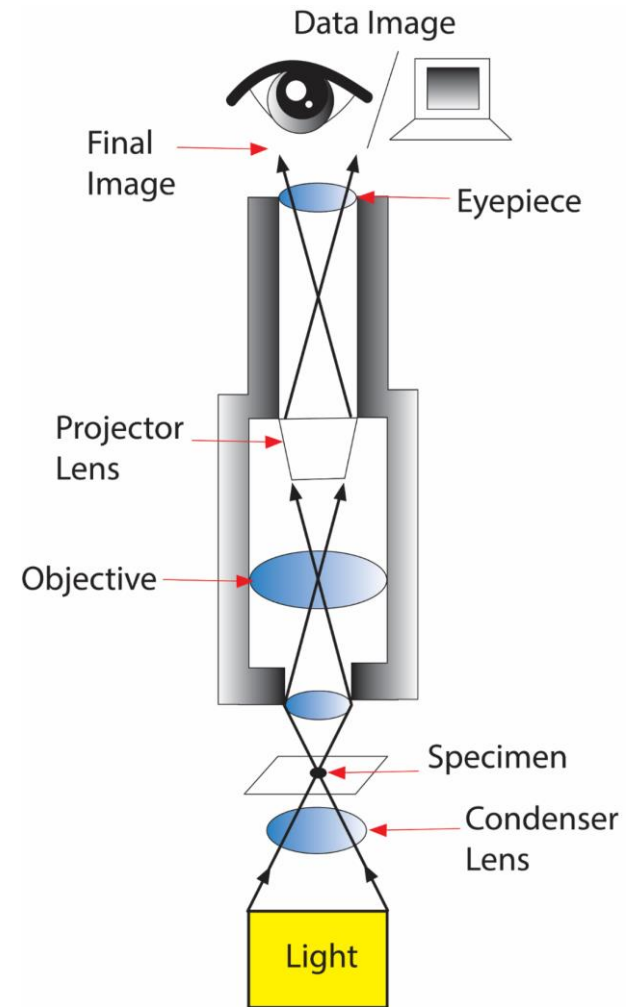


Photo: Dr Kristiina Johanson

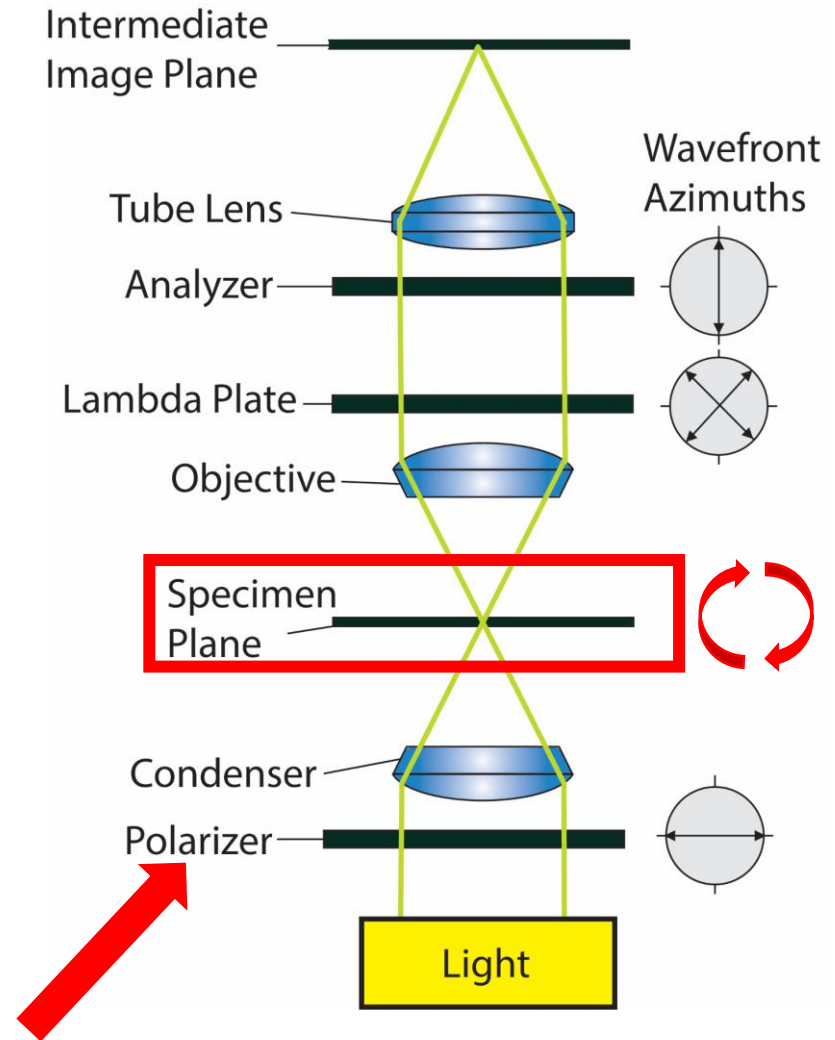
General principle of optical light microscopy

- In optical microscopic analyses light and lenses are used to enlarge object that we are observing.
- Magnification – process of enlarging the apparent size
 - Up to 2000x
- Resolution - ability to see details



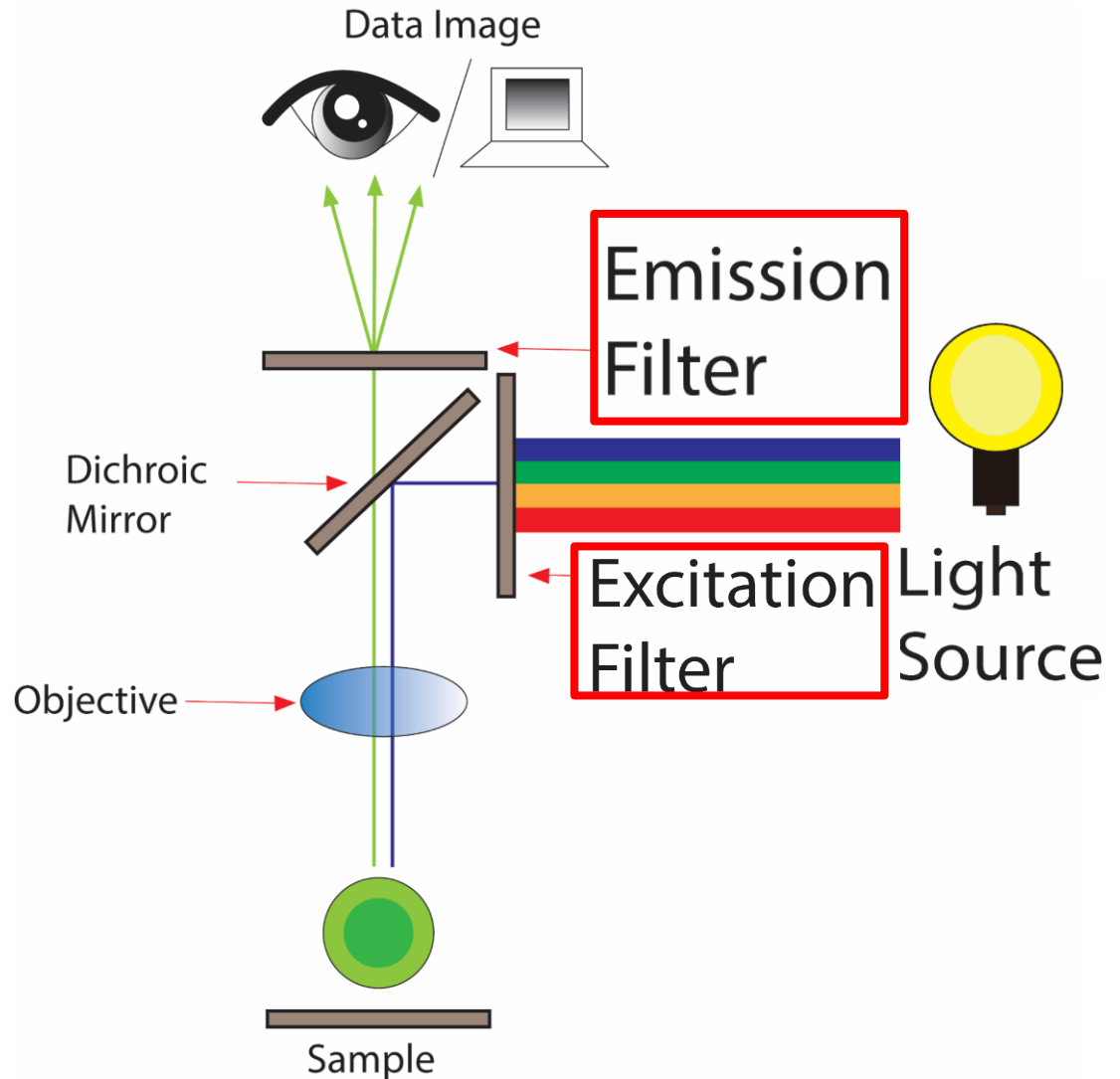
Polarized light microscopy

- Polarized light uses polarizing filters
- Analysis done due to samples optical anisotropic characters
 - Different properties in different directions



Fluorescence microscopy

- Property of absorbing light at certain wavelength and emitting light at longer wavelength
- Object have to have fluorophoric structure



Analysis of cross-section of a paint



**Coat of arms of
C.J. Ekesparre (18th c.)**

*Photo: Conservation and Digitization
Centre Kanut*

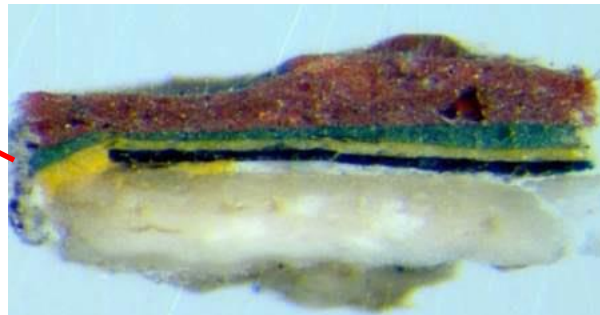
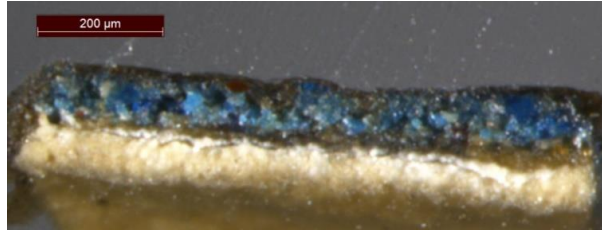


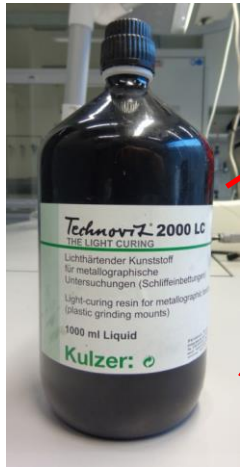
Photo: Kadri Künnapuu



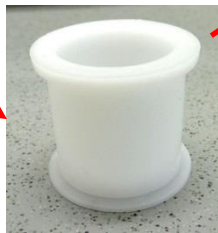
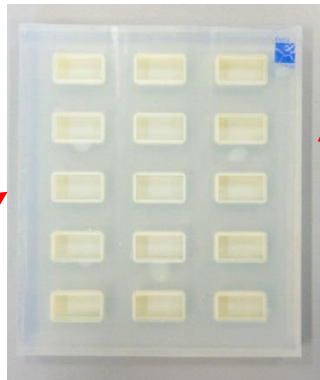
**Figure from the high
altar of Tallinn's St.
Nicholas' Church
(16 or 17th c.)**

*Photo: Art Museum of Estonia,
The Estonian Academy of Arts*

Analysis of cross-section of a paint



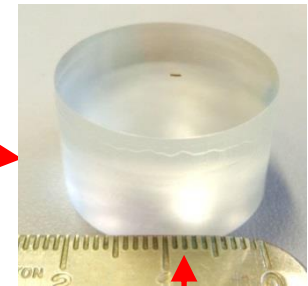
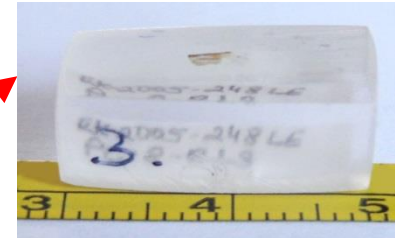
Polymer



Moulds



Visible blue-light polymerization device



Polishing instrument

Analysis of cross-section of a paint



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*Photo: Conservation and Digitization
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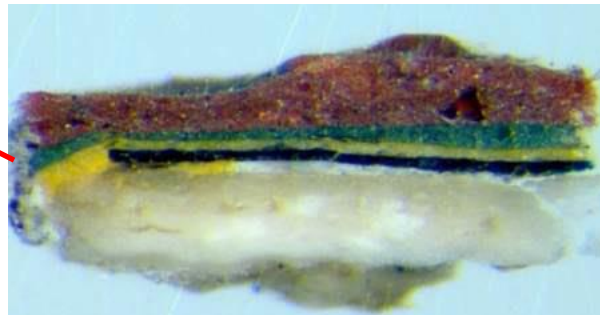
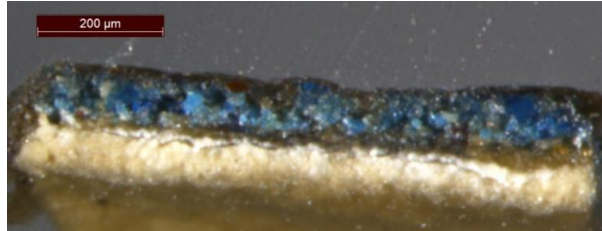


Photo: Kadri Künnapuu



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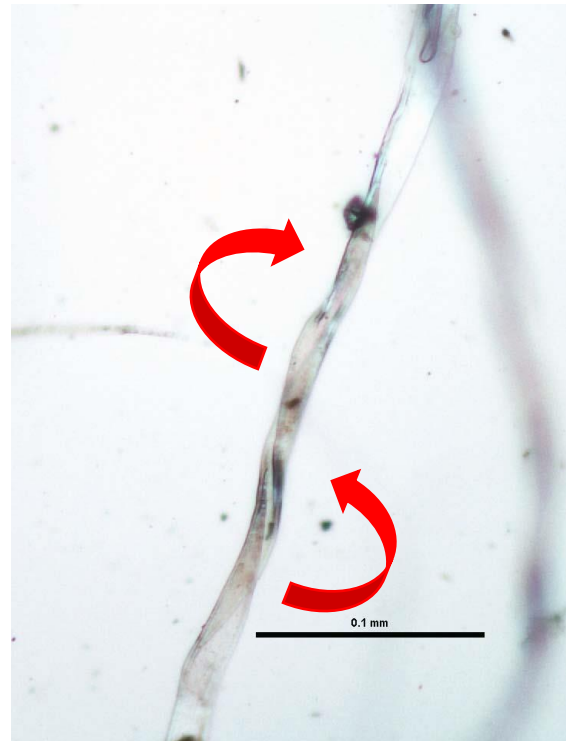
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Analysis of natural fibres

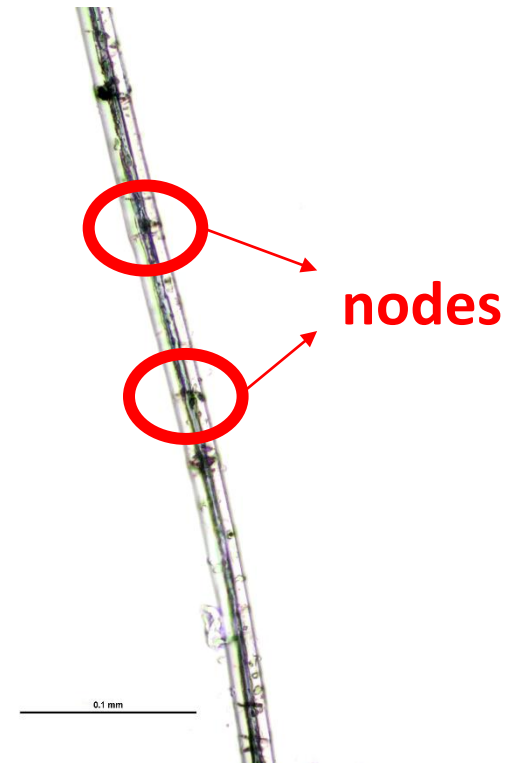
Optical light microscopy



Sheep wool

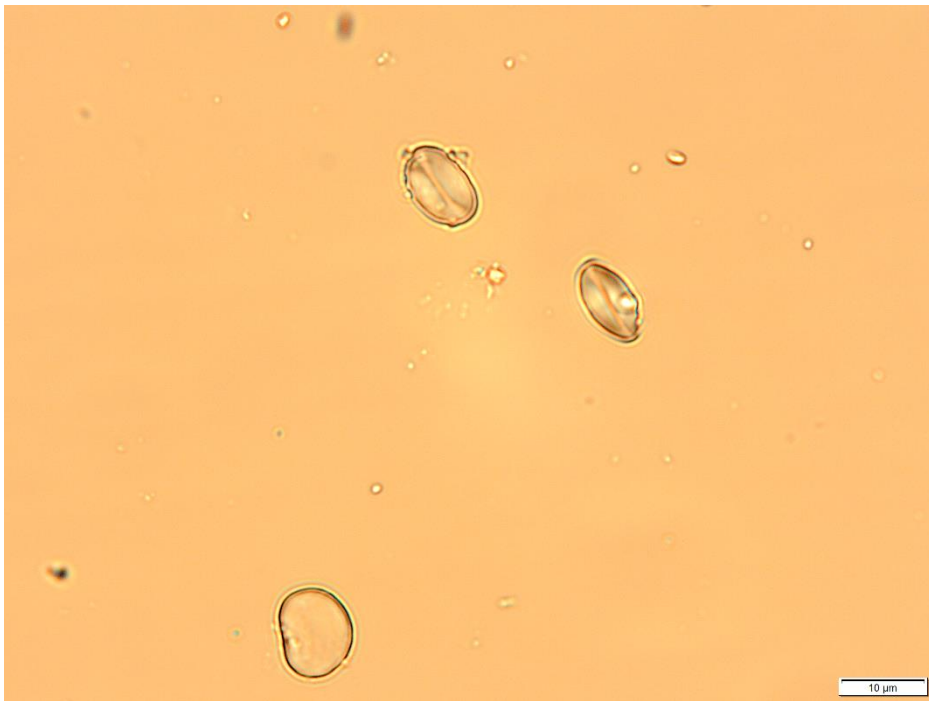


Cotton



Linen

Analysis of *plant remains* *Rye (Secale cereale) starch under optical* *and polarized light microscopy*



Optical light microscopy



Polarized light microscopy

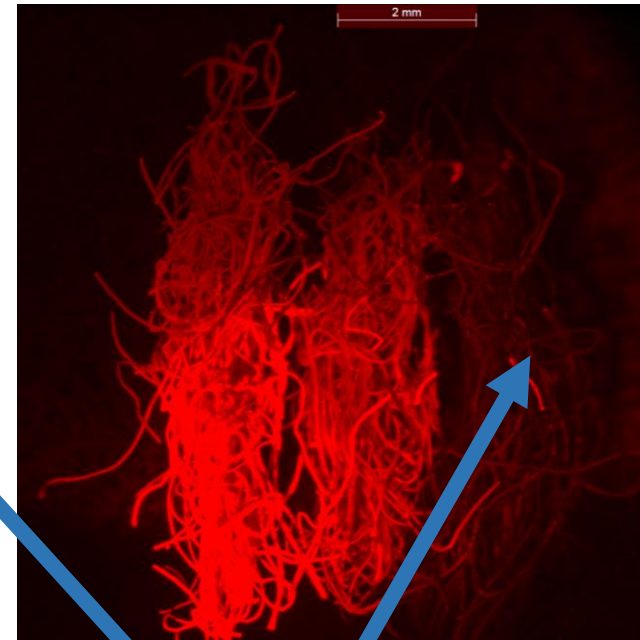
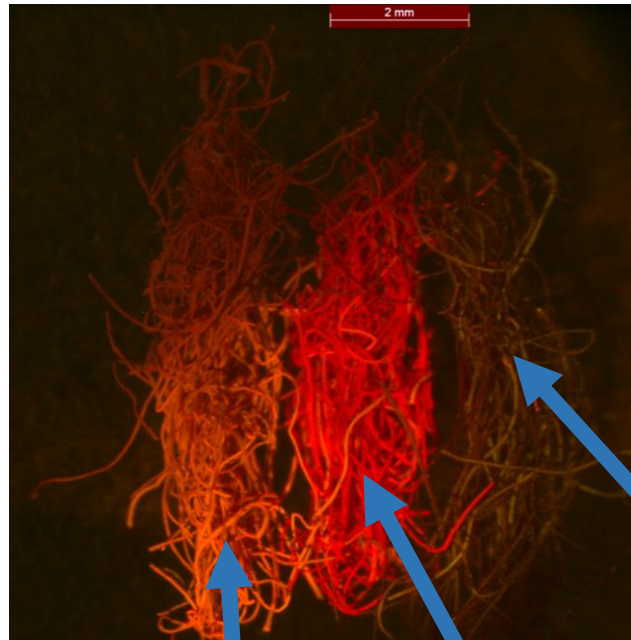
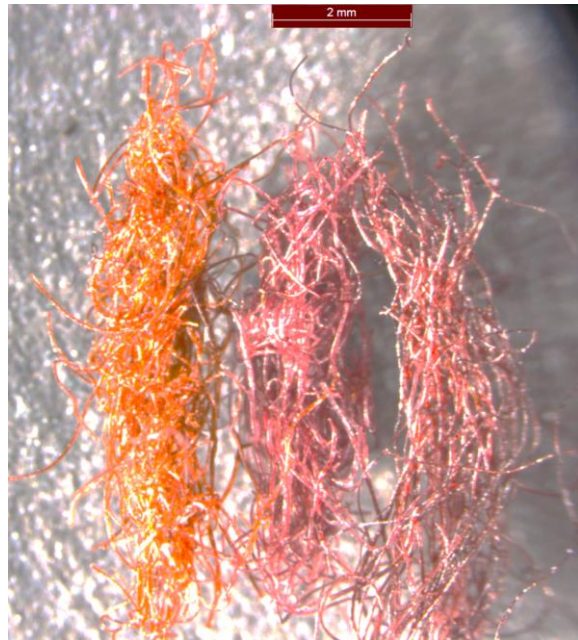
Photos: Dr Kristiina Johanson

Analysis of dyed fibres

Optical light
microscopy

Fluorescence
microscopy
with blue excitacion

Fluorescence
microscopy
with green excitacion



Textile fibres dyed with: logwood, cochineal and unknown dye

Summary

Method for getting **visual information** about small objects or small parts of the objects.

Often **first step** of analysis before all the chemical methods.

Possible to analyse paint layers, textile fibres and dyes, plants remains etc.