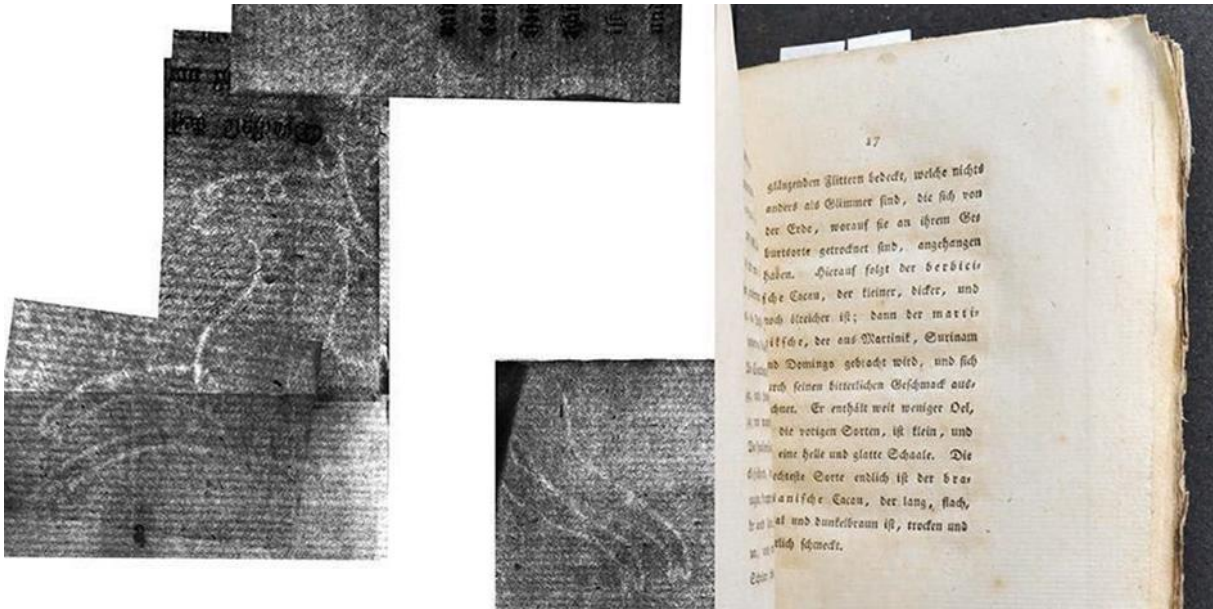


If several fragments of watermarks are found in the book, it is desirable to try to put these fragments together. The watermark of a deer was put together in this way from several fragments. After the manual assembly was completed, the assembled form – except for part of the deer torso itself – can give reliable information about the watermark.



An image of a deer watermark from the book *Kallopistria ober die Kunst der Toilette* taken with a video spectral comparator. Observed in visible side light without filters. Graphic design – cropping; layer mask black and white; joining by hand folding.

Another method uses transmitted light or rather a specific part of it. The method uses Dylux light-sensitive papers. Dylux papers are coated with a sensitive layer, which consists of a yellow dye sensitive to blue fluorescent and ultraviolet radiation. By illuminating the blue part of the visible radiation or near-UV radiation, the printing on the paper will be considerably suppressed, thus highlighting the watermark.



Making a watermark visible using Dylux 503 light-sensitive paper

Thermography

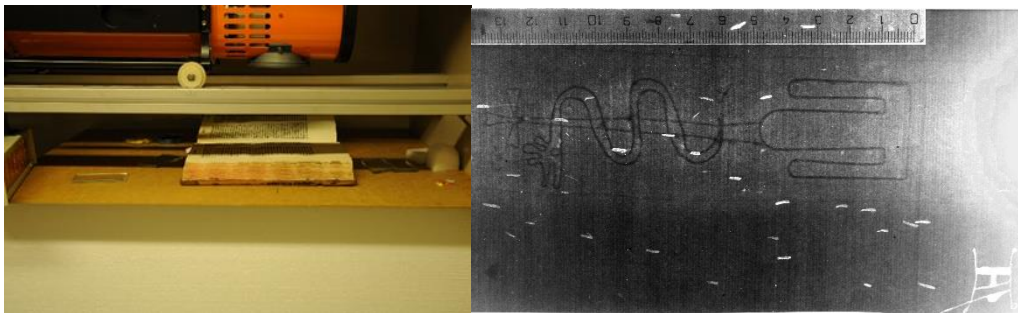
Nearly complete elimination of the colour layer occurs when thermography is used. This method uses the passage of infrared radiation from a heating element through paper and subsequent imaging with a thermographic camera. The element is heated to 40 °C and therefore the paper cannot be damaged. The thermal imager takes a picture of the paper while the heating element is placed behind the paper; when the element remains behind the paper, the entire sheet of paper is heated and the watermark is made invisible.



The method of holding the document approached by the heating element from behind, and the resulting image of the thermography.

X-rays

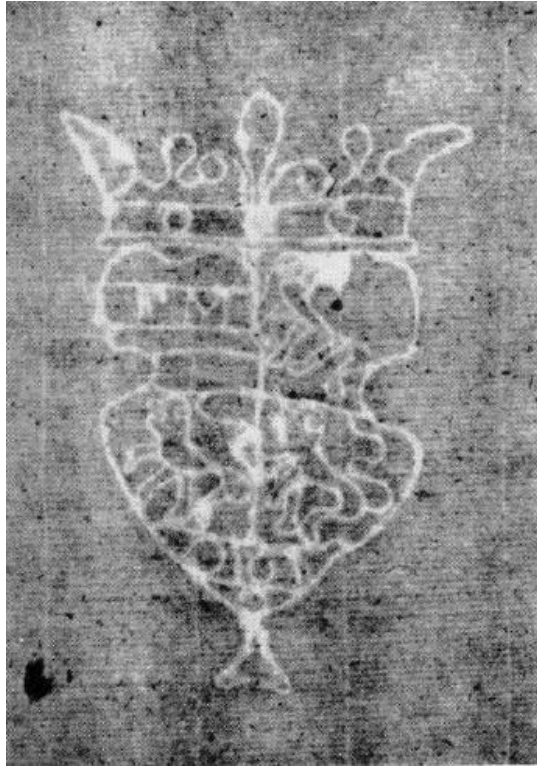
This method uses the so-called Grenz rays, which are a very soft part of electromagnetic radiation lying on the boundary between X-rays and UV radiation. These rays pass through the paper in the thinned area of the watermark more easily than in the surrounding area and are not retained by the print or the handwriting present on the paper. The coloured layer containing heavy metals is not suppressed by this method, especially the presence of vermilion in illuminated manuscripts, etc. This method cannot yet be used with the existing X-ray source at the NK CR workplace because the voltage of this source and the sensitivity of the detector have their limitations.



The X-ray system of the Central Bohemian Museum in Roztoky u Prahy with a scanned book; film inserted under the sheet. The resulting visualisation of the watermark (three-peaks) using low-energy X-rays (negative on film). The watermark lines are black (the smallest paper thickness). White spaces are traces of letters painted with vermilion (HgS). Source [BENEŠOVÁ, BOLDAN, 2011].

Beta Radiography

In beta radiography, high-energy electron radiation is generated from a radioactive source. Carbon-14 (^{14}C), covered in Perspex sheets (PMMA), is most often used as a radioactive source. A set of Perspex, paper with watermark and sensitive film is thus exposed. In this method, printing and handwriting are largely eliminated and a complete watermark shape can be obtained.



Making a watermark visible using beta radiography