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**CELLULOSE FIBRES IN OLD BOOKS AND PAPERS –
IDENTIFICATION AND DETERMINATION OF DEGRADATION
BY TD-CGC/MS AND SPME-CGC/MS**

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Historical papers should be only restored after the exact knowledge of their fibre species composition as well as their degree of damage. Information on paper state and cellulose sources can be received by quantitative fibre analysis using microscopical techniques (light- and UV-microscopy) and modern instrumental analytical methods like FT-IR spectroscopy, VIS spectrometry photometry and CGC/MS.

This contribution deals with two methods having in common the chromatographic technique of capillary gas chromatography/mass spectrometry (CGC/MS) and differing in pretreatment of samples:

- Thermal desorption/gas chromatography/mass spectrometry (TD-CGC/MS) which is well-known for its small sample demand without requiring sample preparation and
- Solid – phase microextraction/ gas chromatography/mass spectro-metry (SPME-CGC/MS) working in headspace mode and adsorbing paper components on polymer coatings (DVB/CarboxenTM and DVB/CarboxenTM/PDMS) before using CGC/MS.

There will be discussed the pros and cons of both methods and their application to altogether 14 old and new paper samples (16th-21st century) stemming from the “Austrian State Archives” and the “Academy of Fine Arts Vienna”.

The main substance class occurring in higher amounts after natural and artificial ageing were aldehydes beside acids, alcohols and benzenic derivatives.

In rag paper from the 18th century nonanal and decanal were found in high quantities and it was selected to test some new methods for restoration purposes. It could be shown that aldehyde scaling of cellulose fibres was considerably reduced after treatment with calcium phytate and nothing was changed in this result even if aged artificially.

The old paper sample “D. Aurelii Parisiis” from 1571 scarcely contained such degradation products, whereas a sample of an housekeeping book from the recent past nearly reached the values of the analyzed rag paper.