



Conservation and Characterization of Arabic Papyrus in Egyptian National Library and Archives, Egypt

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Papyrus was the main writing support in Egypt since 3,000 BCE and was adopted by Arab Muslims in the 7th century until it was gradually superseded by paper in the 10th CE



Papyrus Plant in Egypt

- The Egyptian National Library and Archives in Cairo contains significant Arabic papyri from the Islamic era. The selected papyrus sheet (card numbers 4583 recto & 4584 verso) represents a personal letter dating to 8th, 9th CE. Measuring (21 H×12W) cm, it is written in Arabic script on the recto (13 lines) and verso (11 lines). The papyrus was found in critical state which needs urgent interaction to solve its problems.

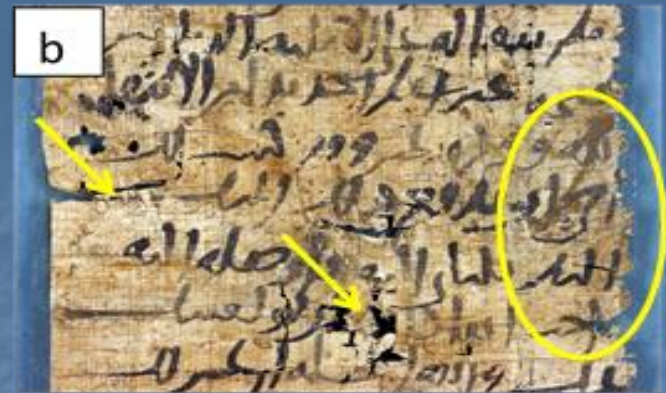
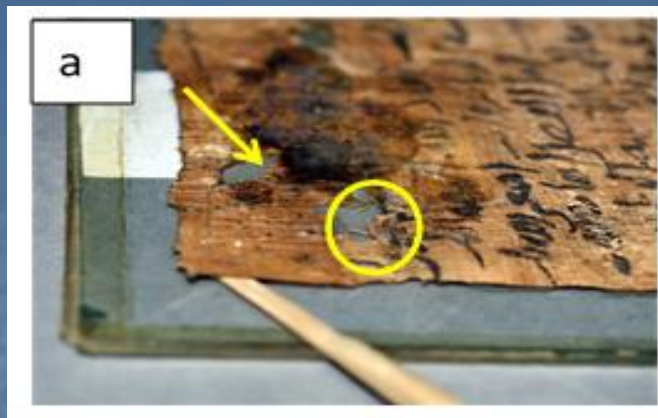
- the main problem is using unknown secondary support adhered with the papyrus verso which caused a big dark stain in the upper part. This stain might be occurred as a result of exposure to direct contact with water during previous treatment or poor conditions storing. The papyrus and its support eventually became as one burnet layer.
- It can be seen that the ink layer in the place of stain has a complete deformation in the text due to dissolving the binder of the ink and the degradation of the surface fibres.



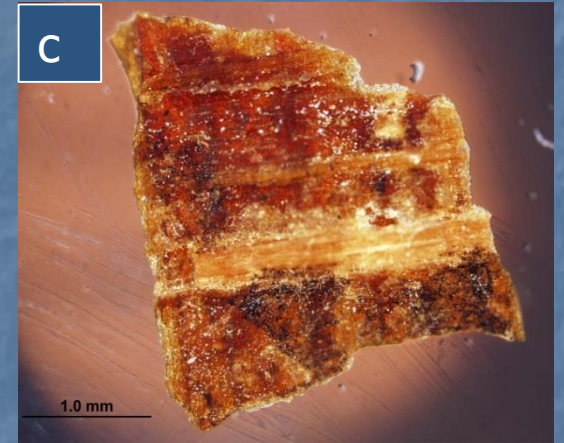
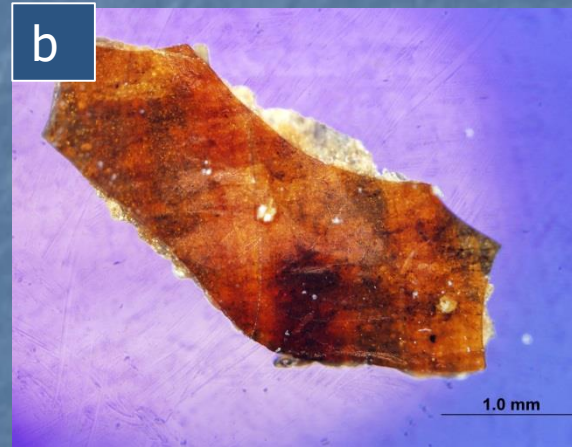
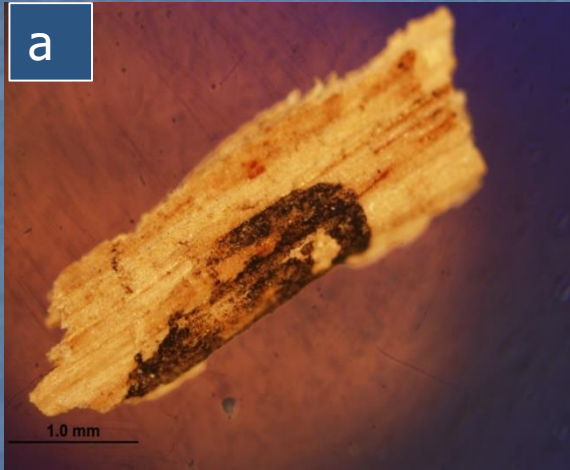
The verso side and the recto side of the selected papyrus before treatment

Non-invasive investigation

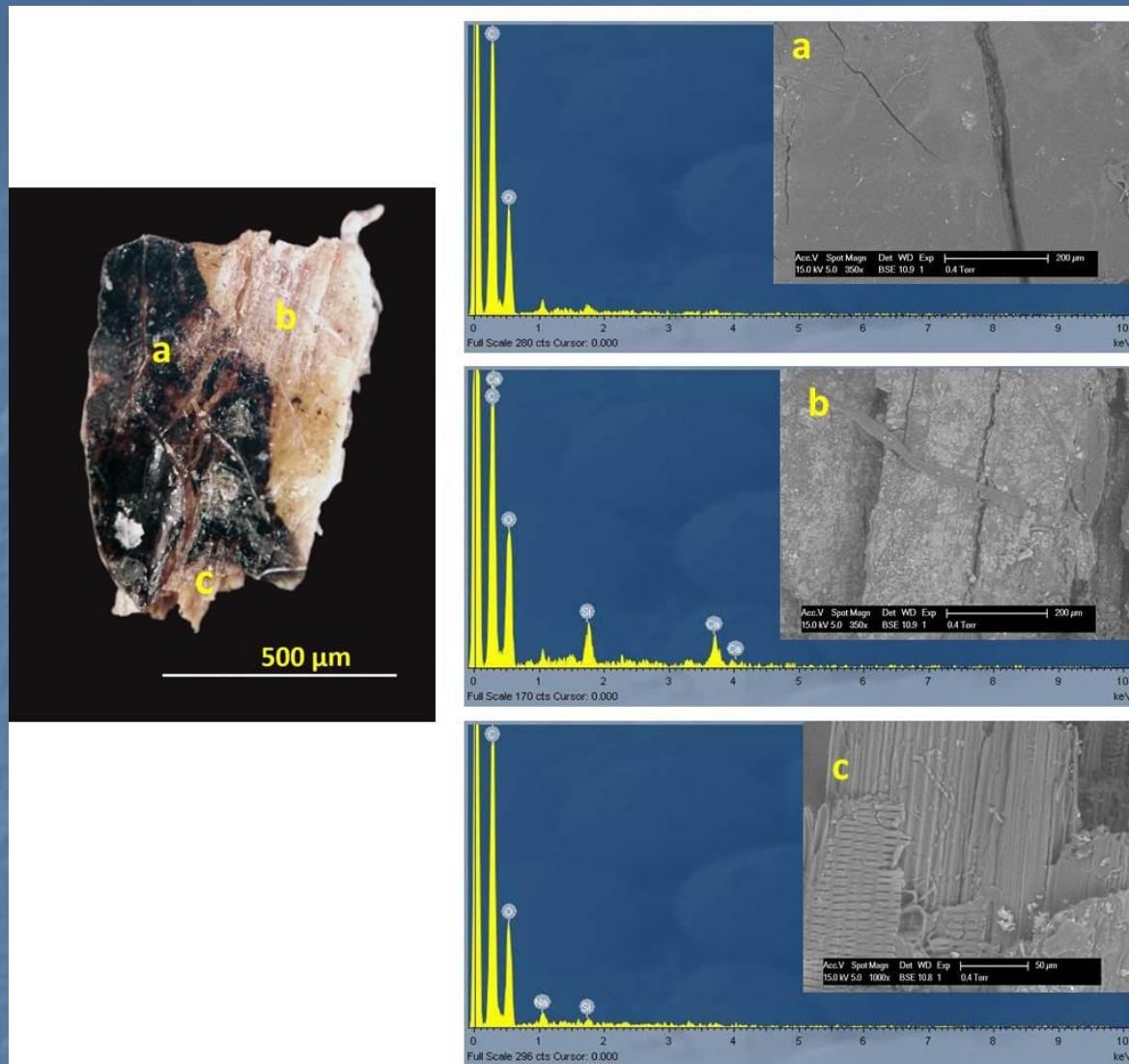
- Visual assessment and photography.
- Visible light microscopy.
- Scanning Electron Microscopy with Energy Dispersive Spectrometry (SEM-EDS).
- Fourier transform infrared spectroscopy with attenuated total reflectance (FTIR-ATR).



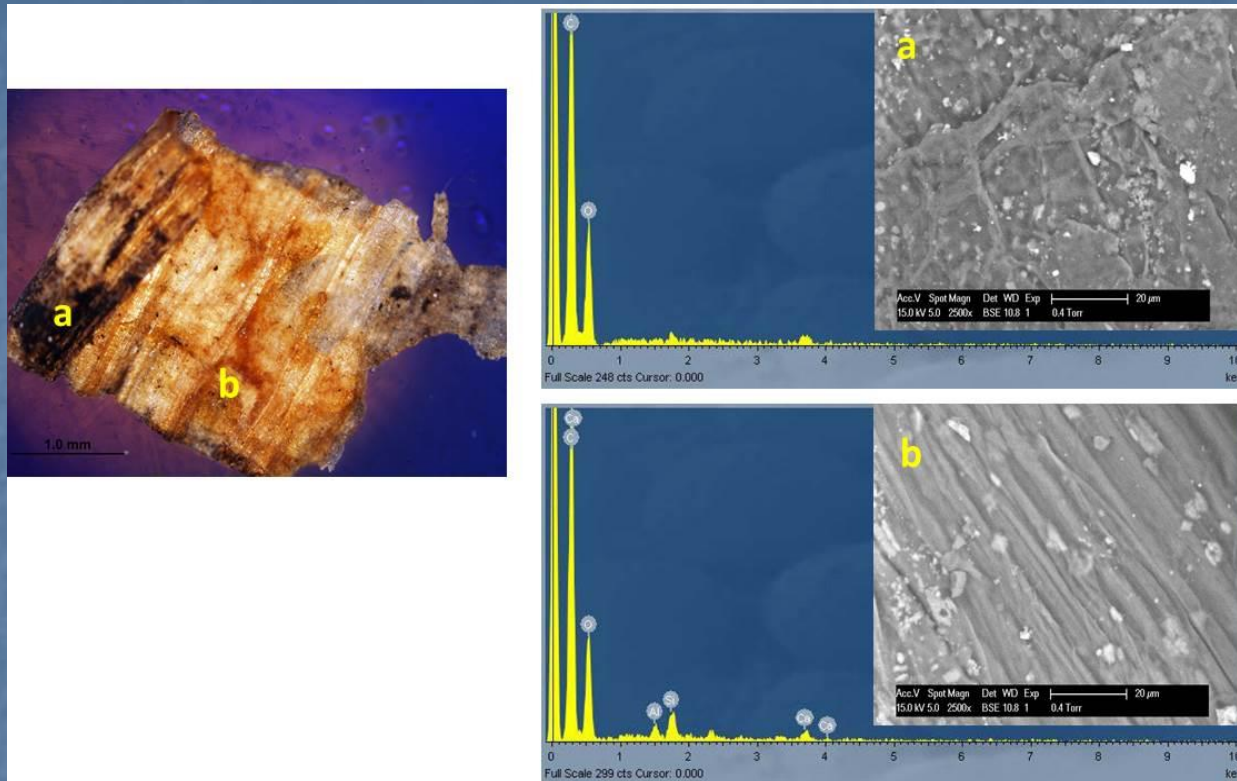
Photographic images
illustrate the deterioration
aspects of both sides of
selected papyrus



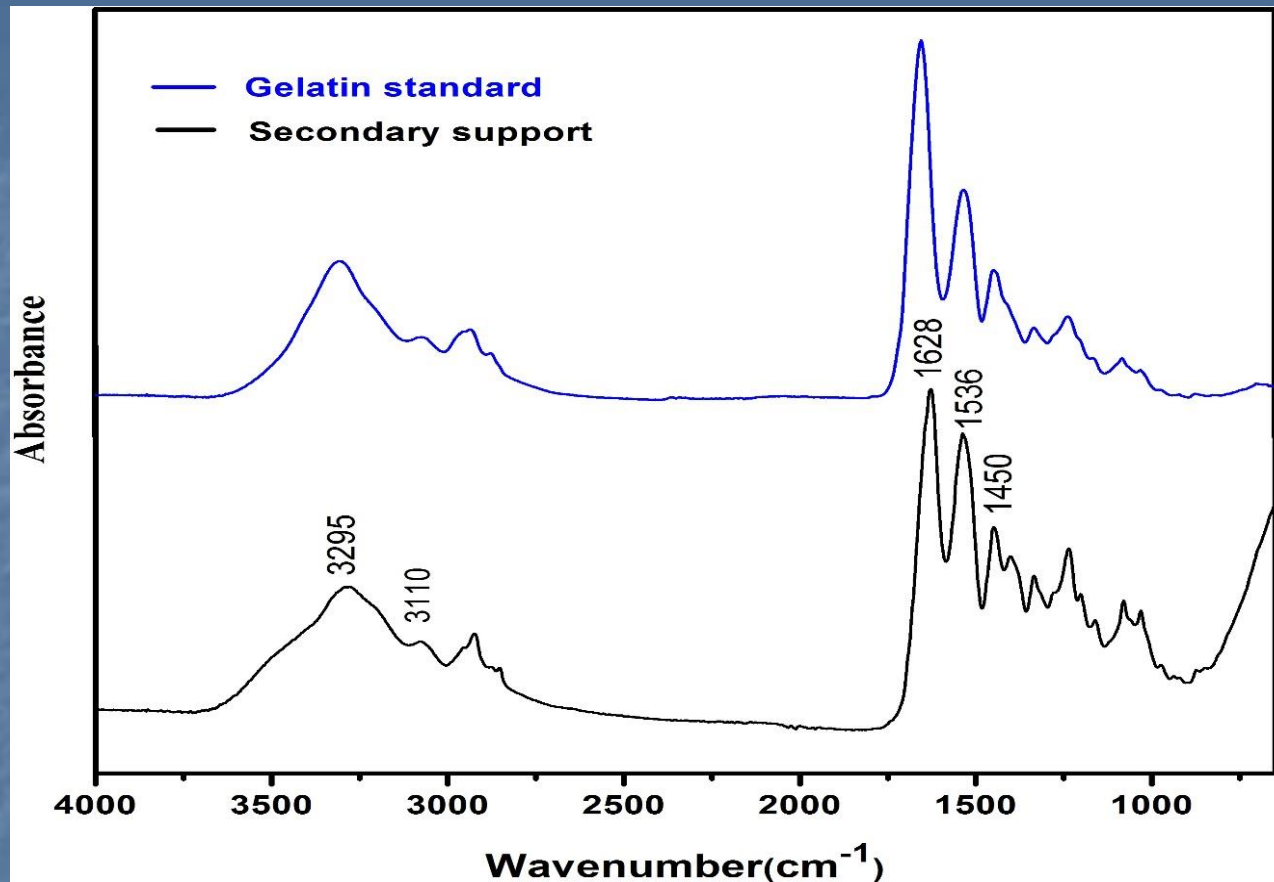
photos of inks and adhesive on papyrus samples using
optical microscopy



SEM-EDS spectra and SEM pictures of the sample (a) the ink, (b) papyrus surface, (c) the cellulose fibers



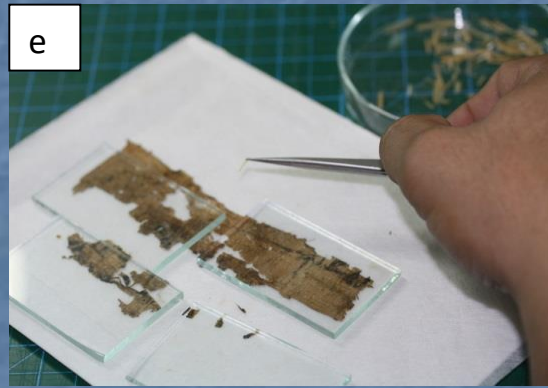
SEM-EDS spectra and SEM pictures (a) spectrum of black ink, (b) spectrum of papyrus surface.



FTIR spectra of papyrus secondary support compared to gelatin standard sample.

Restoration processes:

- Cleaning.
- Removing the gelatin support.
- Bridging tears.
- Mounting.



- (a) Opening the old mounting frame.
- (b) Applying poultice from dampened acid free blotting paper to facilitate the gelatin's removal process.
- (c) Mechanical removal of adhered gelatin.
- (d) Use strips from remoistenable tissue to join tears and support weak areas
- (f) The papyrus after treatment and mounting.

Conclusion

It is clear that modern analysis devices have a great role in success of conservation process. In this study FTIR-ATR analysis has confirmed that the secondary support was composed of gelatin, which led to select the appropriate technique to remove it successfully, in addition to that SEM-EDS have been successfully employed for the characterization of papyrus surface and identification the type of ink. From the perspective of conservation, a successful method of removing the gelatin secondary support had depended on recognizing its properties especially toward water and chemical materials, using small poultices from blotting paper damped with warm water is an effective technique to facilitate the removal of gelatin secondary support and should followed by using tweezers and this technique can be used in the similar cases.

Thank
You



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