

ON THE COLOURING OF PURPLE CODICES

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Purple parchments, written in gold and silver and commissioned by kings and emperors throughout the Late Antique and Middle Ages, were always considered objects of enormous prestige and symbolic value. These precious parchments have been much studied from the artistic and the symbolic viewpoints, but have received less attention in the matters of materials used and the technique of their application. By considering the great symbolic value of purple codices, dyeing of parchment with Tyrian purple has been possibly taken for granted, even without diagnostic counterchecks. Scientific investigation and analysis, in fact, has rarely been employed [1-6] and just in two cases robust information was obtained employing an invasive analytical approach [7,8]. Moreover, the recipes and other technical literature from the period are unclear as to the procedures themselves - either with the nature of the purple itself, or how it was employed to colour parchment.

As well as analysis of the manuscript, this study presents an historical reconstruction of the original materials used by preparing samples of parchment dyed and painted with natural dyes. Tyrian purple, folium, orchil and anthraquinonic dyes were used. Non-invasive analytical techniques were then applied on four codices datable from 6th to 8th century A.D. in order to gain molecular and elemental information on dyes and pigments. The analytical procedure was performed *in situ* with portable instruments and involved the sequential use of UV-Visible Diffuse Reflectance Spectrophotometry with fibre optics (FORS), spectrofluorimetry and X-ray Fluorescence Spectrometry (XRF). The considered codices are known as *Vienna Genesis* (Vienna, Österreichische Nationalbibliothek), *Krönungsevangeliar* (Vienna, Kunsthistorisches Museum Vienna, Treasury), *Evangeliaro di Sarezzano* (Tortona, Archivio Diocesano) and *Codex Brixianus* (Brescia, Biblioteca Queriniana).

Our results clearly show that in all cases Tyrian purple can be excluded from the set of the possible colorants employed on the parchment and other dyes shall instead be considered (Fig. 1), with folium and orchil as the most probable candidates.

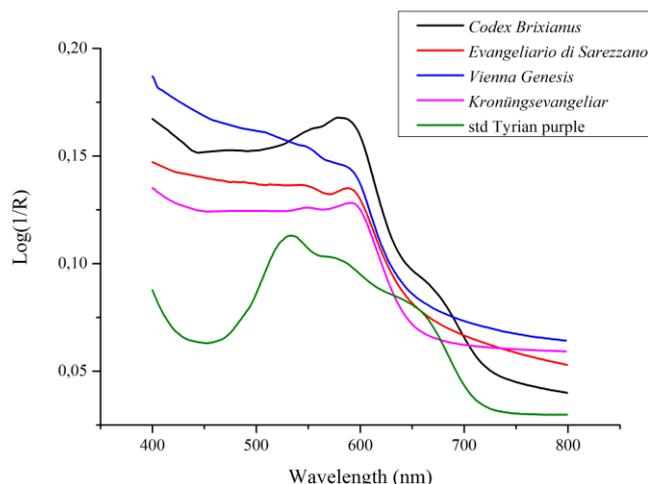


Fig. 1. FORS spectra from parchments of four purple codices and from a standard of Tyrian purple

Similar results were suggested from spectrofluorimetric analysis. XRF yielded the most surprising results: bromine was detected in all manuscripts, but further measurements on standard parchment samples allowed to verify that the precursors of orchil and folium, respectively the lichen *Rocella tinctoria* and the plant *Chrozophora tinctoria*, are both rich in bromine, so that this element cannot anymore be considered as a marker for Tyrian purple.

According to these results and to the results of visual inspection of purple parchments at high magnification, it can be hypothesised that the technique used by ancient artisans to impart colour to parchment is different from what it is generally thought. First of all, it is not correct to think about soaking of parchment in a dyeing bath, as it is usual for textiles, since in such a way parchment would lose its strength. Colour could be imparted at the early stage of parchment production, i.e. before stretching it, but subsequent working (brushing with pumice stone, use of chalk, etc.) would make colour vanish. It is more proper to think about a brush or a *pezzuola* soaked into a dye solution and then rubbed on the parchment in order to stain it to the desired hue. This procedure would the use of Tyrian purple, since it cannot be applied employing an aqueous solution; had it applied after conversion to the soluble leuco-form, reoxidation would make it precipitate onto parchment and its grains would be detected, which is not the case in the samples studied. One can hypothesise the use of direct staining with juice soon extracted from molluscs and rubbed onto parchment, but this would mean use of several thousands of items for one single manuscript. The more reasonable hypothesis, which conciliates the results from analysis and the scarcity of information from ancient treatises, is that substitutes of Tyrian purple, such as orchil or folium, were always used in place of it.

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