

Oral Contributions

[MS40-01] **Analysis of Clay Minerals in the Fine Art as a Part of Provenance Studies.** Petr Bezdička, Janka Hradilová and David Hradil,

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Application of X-ray diffraction based techniques in the analysis of artworks is not only beneficial for indisputable identification of crystal constituents in colour layers, but it can also bring insight in the structure of materials, which can be affected by their geological formation, manufacturing procedure or secondary changes. This knowledge might be helpful for art historic evaluation of an artwork as well as for its conservation. Among these modern non-destructive analytical methods the laboratory X-ray powder micro-diffraction becomes more and more widely used as effective tool for such a direct analysis [1,2]. Since ancient times, clay minerals formed a substantial part of earth colours. Later in panel and easel paintings they act as pigments, fillers, preparatory materials, and grounds for gilding. In the painting technology, the content of clay minerals increases the adhesive power of the material, but on the other hand, it could increase the risk of its swelling in wet conditions, when expandable clay structures prevail. Beside the explanation of the links between the composition of clays and their properties, clay minerals could play an important role in the provenance studies, because they are sensitive indicators of physical-chemical conditions of the process of their formation and transformation in nature. We have already investigated important sources of green earths at Úhošťany near Kadaň, Western Bohemia and the so-called white Bohemian boles – kaolins, that has been used in the preparatory layer of Gothic mural paintings in Bor near Karlovy Vary. In the first case an interstratified structure of celadonite/Fe-smectite was identified as a characteristic feature, and in the second case, crystallinity

indices were used for distinguishing of kaolinites from different sources [3,4]. Although, there are a lot of other mineralogical localities of clay and iron pigments in Central Europe, most of them have never reached an economic importance and therefore, their detailed investigation is not further relevant. In literary data, some Mid-European deposits are proving to be promising in that respect. One of them is the Tertiary red clay deposit at the margin of North-Bohemian basin, formed by re-deposited altered volcanic material of lateritic character in Hořenec, North-Western Bohemia, described already in 18th Century manuscripts as red Bohemian bole. The other one, the Bavarian red-brown ochre is more sandy clay, known from its historic mining site in Steinach, Bavaria, Germany, and today still available. Well-documented is the historic production (since 14th Century!) of chrysopras – green Ni-bearing gemstones of chalcedony group used by Prague's workshops for jewellery and wall decorations (the most famous one is located in the St. Wenceslas chapel of the Prague's cathedral). These gemstones were mined at the Ni-laterite deposit at Szklary near Zabkowice in Lower Silesia, Poland. This lecture will give examples of successful application of laboratory X-ray powder micro-diffraction in attributing the provenance of artworks.

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