

Liquid chromatography with UV-Vis and mass spectrometric detection for the identification of natural dyes in 19th-20th c. Oriental rugs

I. Petroviciu¹, I. Crețu², F. Albu³, A. Medvedovici⁴

¹ National Museum of Romanian History (MNIR), Bucharest, Romania

² National Museum of Art of Romania (MNAR), Bucharest, Romania

³ S.C. LaborMed Pharma S.A., Bucharest, Romania

⁴ University of Bucharest, Faculty of Chemistry, Bucharest, Romania
petroviciu@yahoo.com

Natural dyes were the only source for textiles dyeing until the second half of the 19th century when synthetic dyes were discovered. Natural dye sources were initially used only locally, then became subject of trade, records of their commerce being documented, as connected to geographical discoveries or historical events. Significant information about historical textiles provenience and manufacturing period may be revealed based on dyes identification, in correlation with the natural sources origin and trade records.

Natural dyes in textiles from Romanian collections have been studied since 1997, first by liquid chromatography with UV-Vis (diode array) detection, in a collaborative effort with the Royal Institute for Cultural Heritage (KIK/IRPA) Brussels and more recently by liquid chromatography with UV-Vis and mass spectrometric detection. The latter approach is based on the progressive use of the (ion trap) mass spectrometer from the Full Scan Mode followed by data procession by Ion Extracted Chromatograms according to the molecular ions of dyes in the database, to the MS/MS Product Ion Scan analysis.

The present study discusses the results obtained by the application of the above mentioned analytical protocol in the identification of dyes in 19th-20th c. Oriental rugs from the collection of the National Museum of Art of Romania. *Rubiatinctorum* L. (madder) was the most used biological source while other sources such as *Dactylopius coccus* (Mexican Cochineal), *Reseda luteola* L. (weld), *Delphinium semibarbatum* L. (isparak), *Rhamnus* sp. (berries), *Rumex/Rheum* sp. (buckthorn), *Caesalpinia* sp. (redwood) and indigoid dyes (*Isatistinctoria* or *Indigofera* sp.) were also detected. Synthetic dyes were also identified. Their presence suggest interventions or date the objects after the second half of the 19th c., when detected in the original parts of the textiles.

The results obtained are in perfect correlation with those reported by other researchers, enrich the existing knowledge on the Oriental rugs in Romanian collections and confirm liquid chromatography with UV-Vis and mass spectrometric detection as an important tool in the study of natural dyes in historical textiles.