Identification of proteins in works of art: combined use of Maldi mass fingerprinting and ELISA

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Proteins in artworks
- What
  - Animal glues: rabbit skin glue, hide glue, French glue, gelatin, parchment size
  - Casein-milk paint
  - Egg white, yellow, yolk
  - Fish glue, fish gelatin, longiss
- Garlic
- Where
  - Grounds
  - Binders
  - Matrices
  - Coatings
  - Gilded surfaces
- Current methods
  - Hydrolysis → AA analysis
  - Immunostaining/ELISA
  - HPLC-UV or MS
  - IR/Raman
  - Proteomics (MFP, LC/MSMS)

Amount of Data
- Reference standards from Harvard’s Gettens Collection
- Protocols established, utilizing a range of matrices
- Partial sequence mass fingerprinting using Maldi-TOF/LD
- LC/MS MS analysis
- Complementarity

Animal glues
- Collagen++ from HRP
- Collagen++ from HRP
- Collagen++ from HRP
- Collagen++ from HRP
- Collagen++ from HRP

Egg Tempera
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14

Milk Paint
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14

Methods / Experimental
- Maldi mass fingerprinting
- Samples as small as 100µm
- Protocols established, utilizing a range of matrices
- Reference standards from Harvard’s Gettens Collection
- LC/MS MS analysis

Milk Paint
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14
- Collagen: 900.14

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References cited

Summary
Maldi mass fingerprinting has been used to identify several classes of proteins in a variety of artworks. In several cases these results have been verified with ELISA. A simple, rapid, one-tube protein solubilization and digestion procedure is described. The method offers an alternative to conservation scientists for protein identification in artworks and historic artifacts. Mass fingerprinting is sensitive and specific and offers the potential for determining species origin of proteins commonly encountered in artworks. ELISA is shown to be sensitive but limited by available antibodies. It can provide a means of identification as well as validation of other methods of protein identification used in conservation science.