

# Advantages and Disadvantages of FTIR Spectroscopy in Identification of Bird Droppings in Painting Conservation

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**Abstract:** Fourier Transform Infrared (FTIR) is a popular technique for identifying unknown organic material in the conservation field. This tool has advantages and disadvantages that were demonstrated in the identification of an unknown material from a painting in the laboratory. A sample was taken from a deposit on a painting and a spectrum procured from the instrument. A positive match was eventually made to the spectrum of a bird dropping collected from a local bird feeder. In conclusion, the FTIR in this case had some limitations in identification of the unknown, in so much as it was a success only with a reference spectrum that was acquired.

**Experimental:** A white deposit was found on the verso stretcher bar of a late 19 or early 20th Century oil painting during documentation (Figure 1 and 3).

-characterization of the deposit was merited, and undertaken in the Queen's labs

**Sampling**

-small sample of the white deposit was scraped from the stretcher bar with a scalpel

**Instrumentation:**

-ATR-FTIR spectrometer (Attenuated Total Reflectance Fourier Transform Infrared) (Figure 2).

-instrument kept the sample intact if further analysis was required

-advantage over GC/MS or LC/MS where sample work up is required.

**Data Interpretation**

-Amide Peak –indicative of protein

- Comparison to proteinaceous standard materials spectra (casein, egg albumin, animal glue): negative

- Comparison to compounds from bird droppings (urea and uric acid): negative

**Acquisition of Standard Spectrum**

-fresh bird dropping removed from Dr. Shurvell's backyard birdfeeder

- Spectrum positive match to unknown spectrum (Figure 4)



Figure 1: Painting of Horses, Recto View, Before Treatment



Figure 2: ATR-FTIR Instrument



Figure 3: White Deposit on Verso of Painting

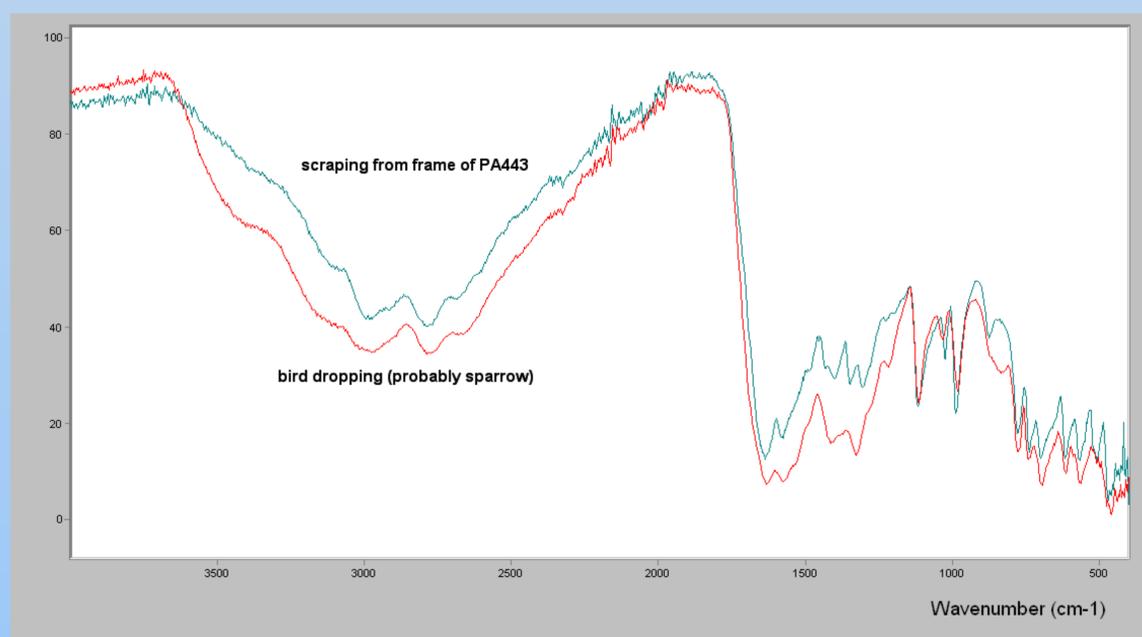


Figure 4: IR spectrum of Deposit Matched to Reference Spectrum of Bird Dropping

**Results and Conclusions:** By obtaining a sample from a local birdfeeder, a reference spectrum of a bird dropping could be obtained. This showed a very good match to the unknown sample confirming its identity; however, this success only occurred with the availability of reference material from a backyard birdfeeder. Positive identification of the bird dropping supports other observations that this painting was poorly treated in the past. Storage in a barn or attic likely occurred at some point. These results, therefore, were not merely an exercise in analytical chemistry, but offer clues into the conditions the painting has experienced, which helps inform conservation treatment.

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