

# Amber analysis by FTIR

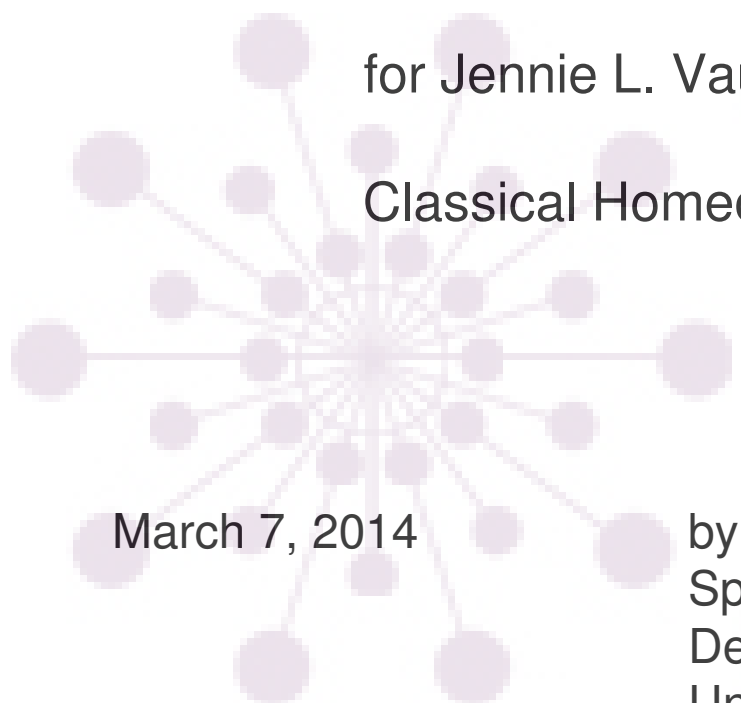
for Jennie L. Vaughn-Campbell, Dhom

Classical Homeopath 818.694.5199

March 7, 2014

by Martin Sadilek, Ph.D., 206-543-4749  
Spectroscopy Facility  
Department of Chemistry  
University of Washington

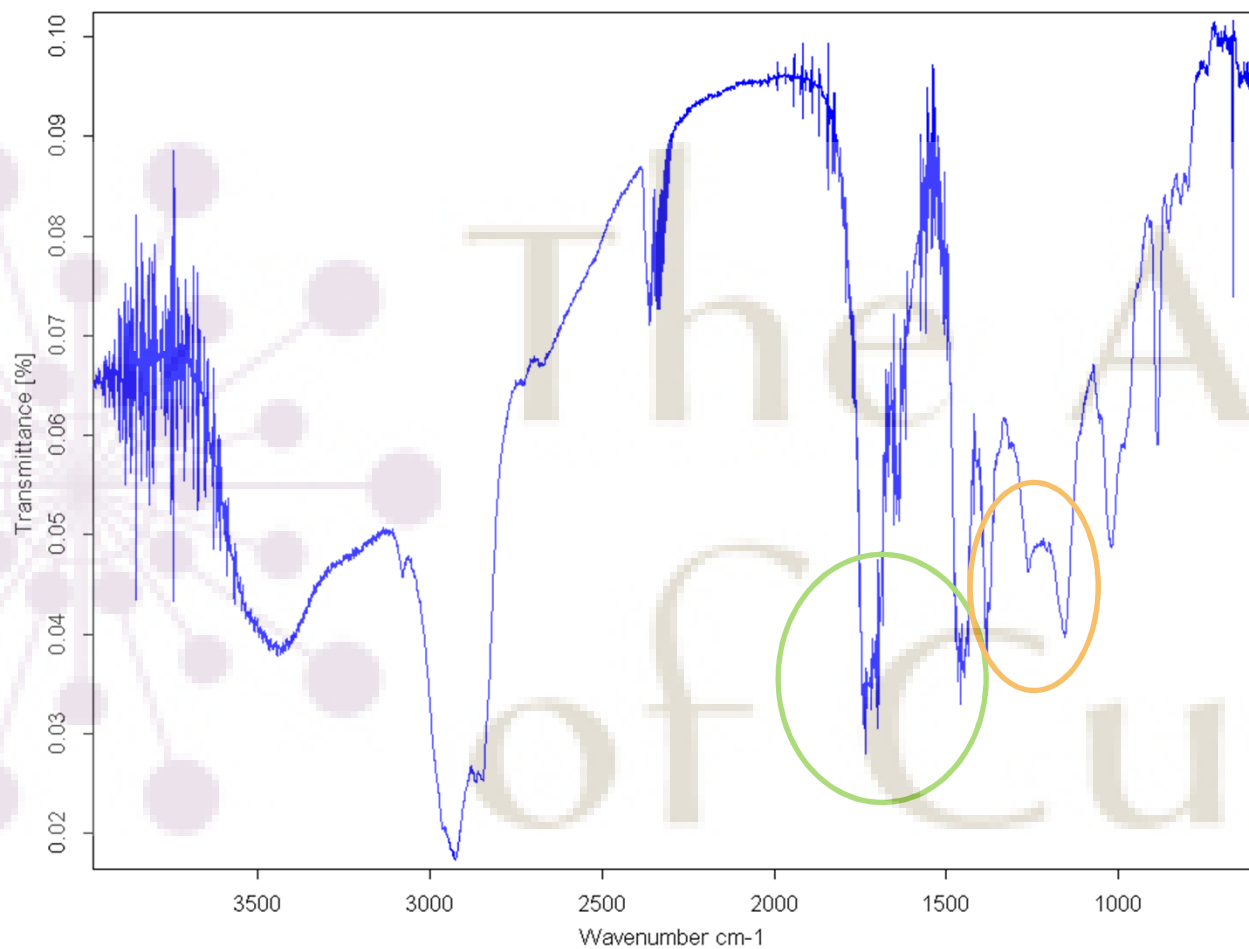
The Art  
of Cure





# Experimental

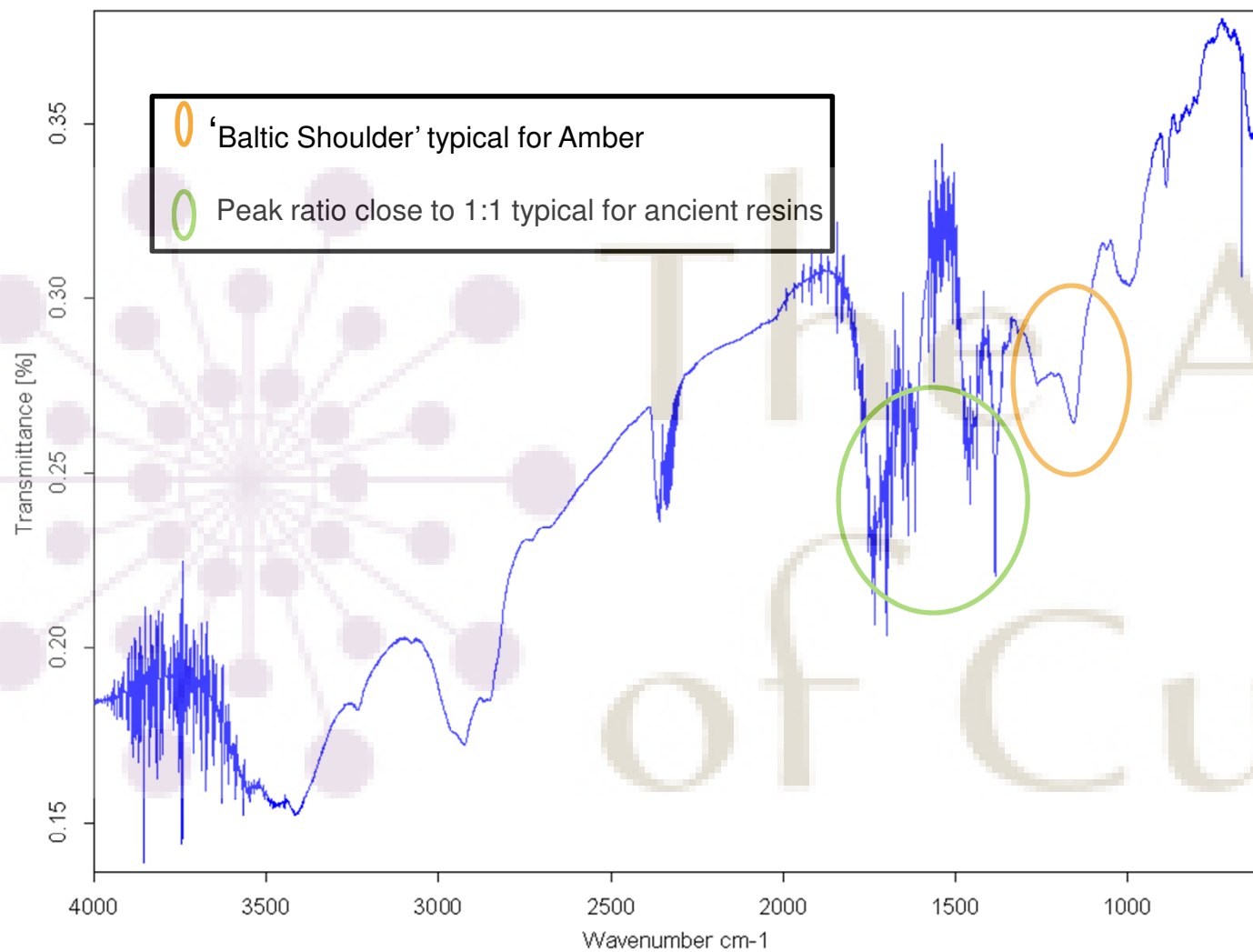
- From the five types of amber necklaces provided one or two beads were removed.
- Beads were crushed and powderized with pestle in mortar.
- About 2mg of amber powder was mixed with 200mg of potassium bromide and pressed on a hydraulic press into a thin IR pellet.
- FTIR (Fourier-transform Infrared) spectra were collected for all 5 types of amber, in spectral range  $500\text{-}4000\text{cm}^{-1}$
- A spectrum of polystyrene was collected and is enclosed for reference

# Green Amber

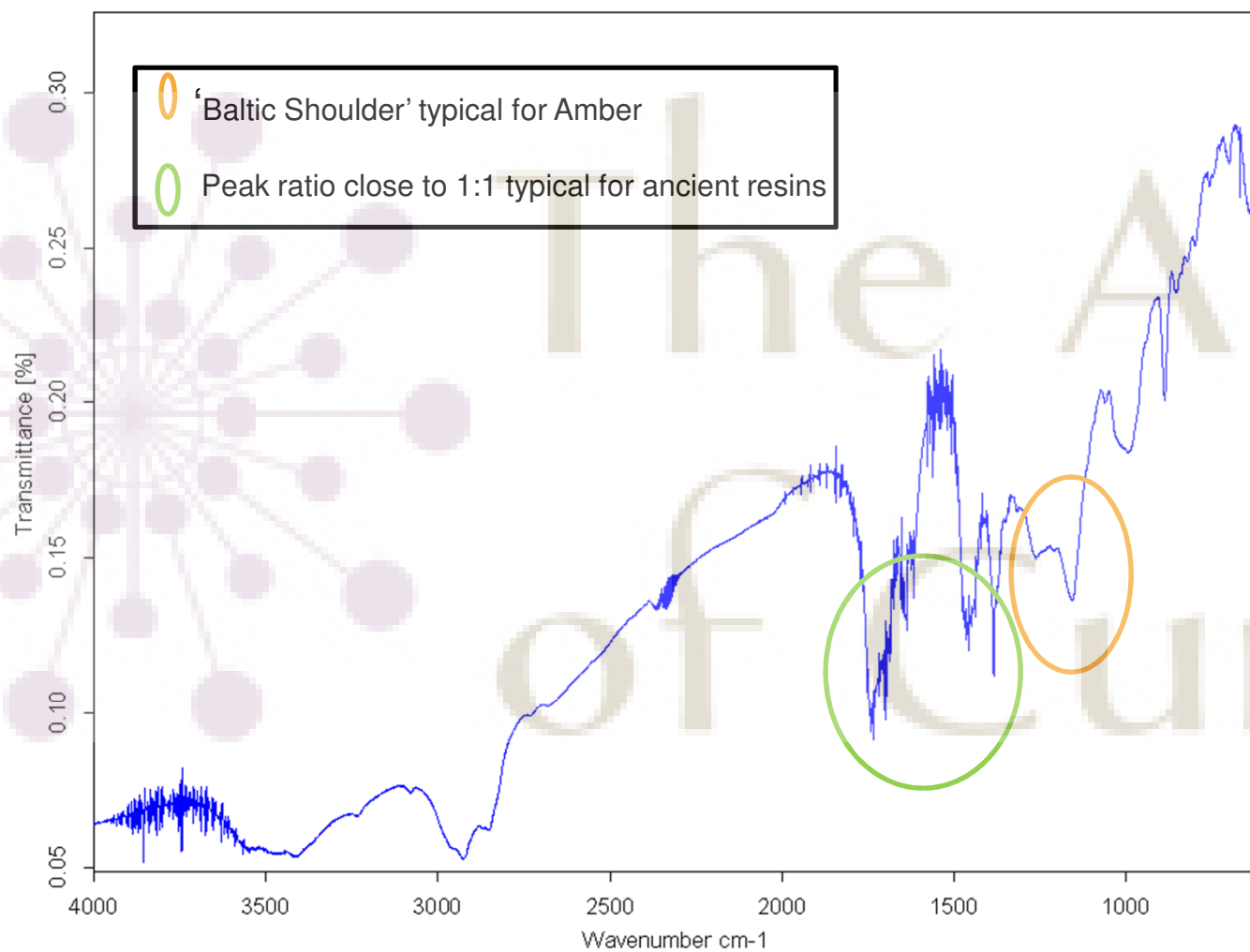


-  'Baltic Shoulder' typical for Amber
-  Peak ratio close to 1:1 typical for ancient resins

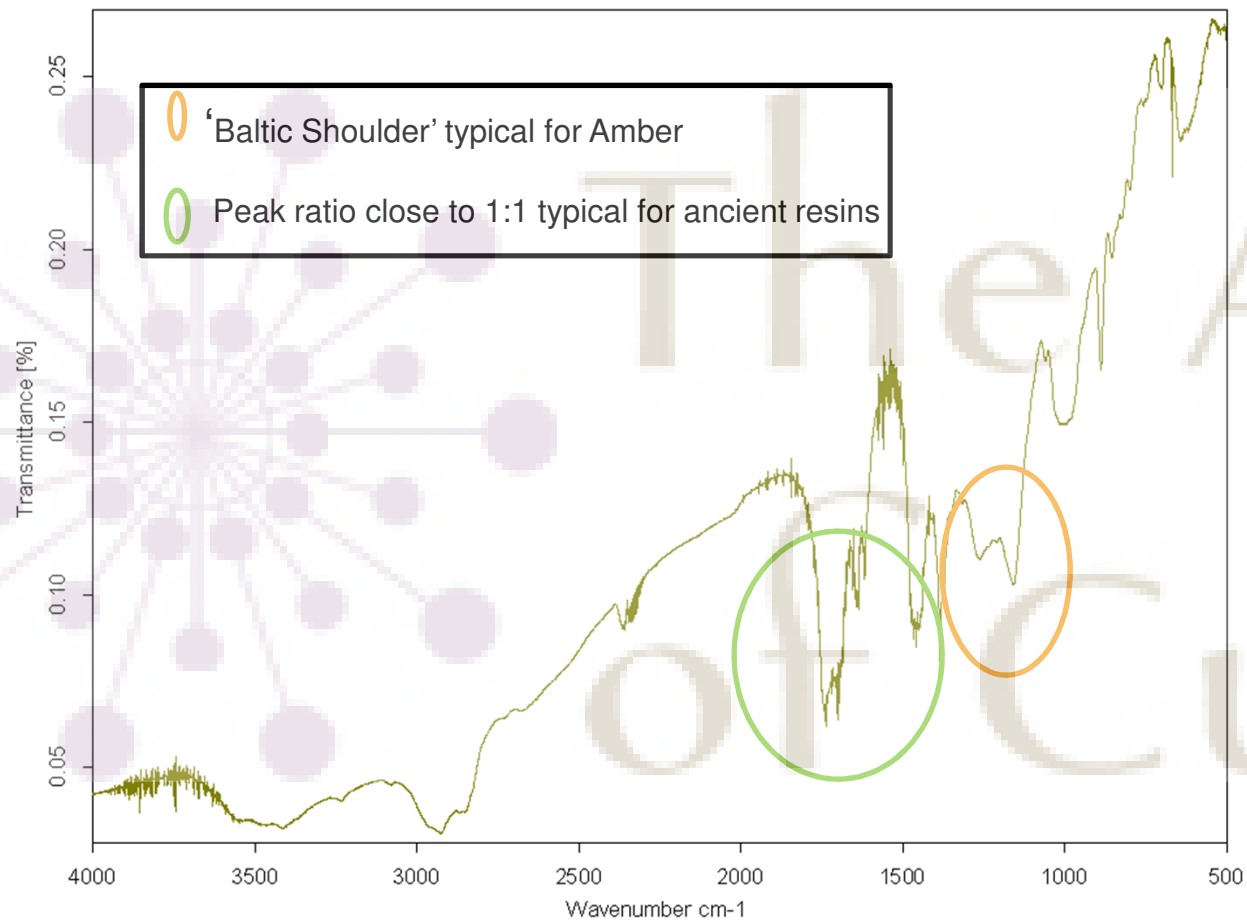
# Cherry Amber



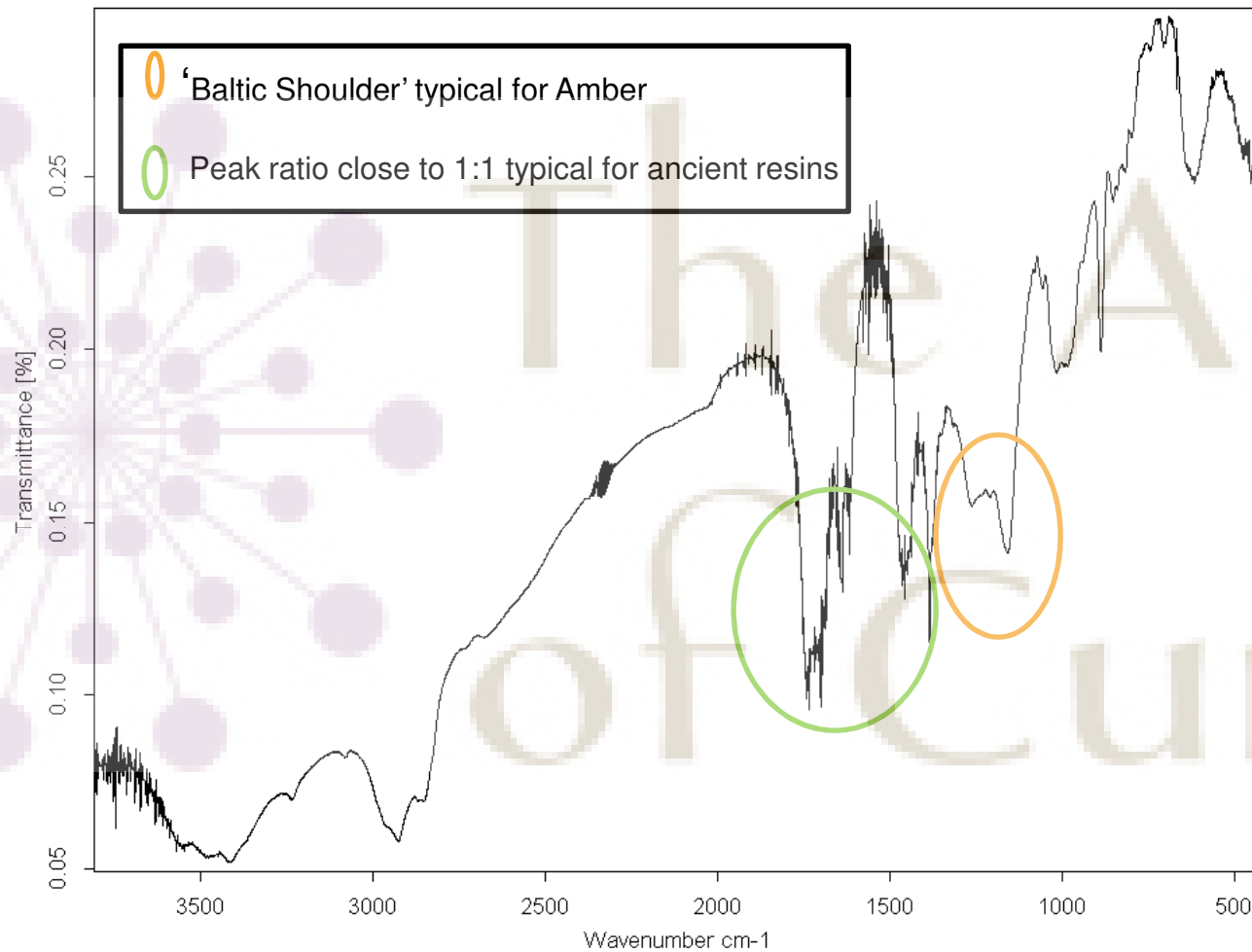
# Honey Amber



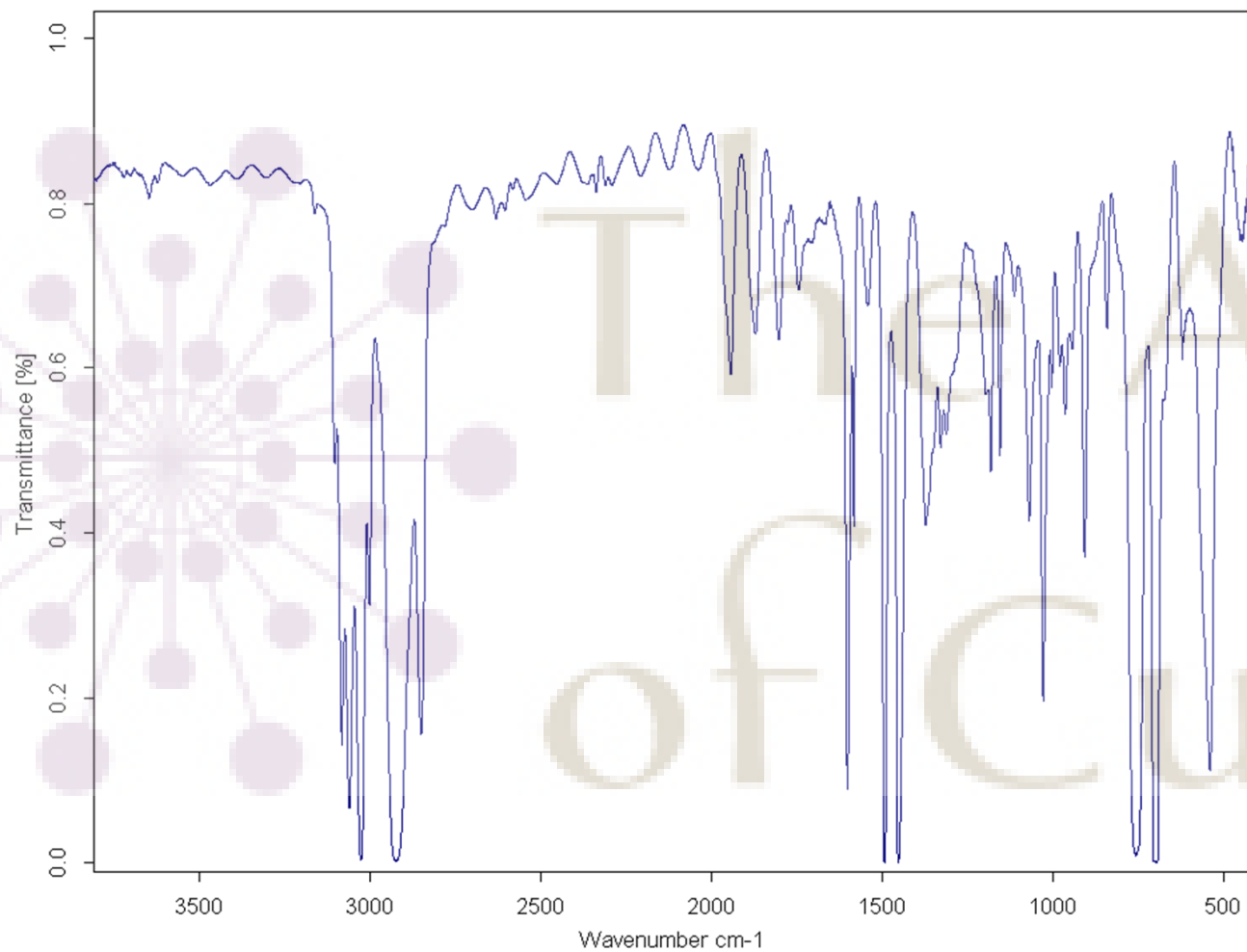
# Lemon Amber



# Milk Amber



# Polystyrene











LIETUVOS PRABAVIMO RŪMAI

BRANGAKMENIŲ TYRIMO LABORATORIJA  
GEM LABORATORY

BRANGAKMENIŲ ŽALIAVOS IR DEIMANTŲ LAUŽO KOKYBĖS  
PAŽYMĖJIMAS Nr. KA000057

Akmuo / Gemstone

Masė / Weight BALTIC AMBER /BALTIJOS GINTARAS  
Neclase with plastic clasp 5,41 g

Spalva / Colour

Pastabos / Comments

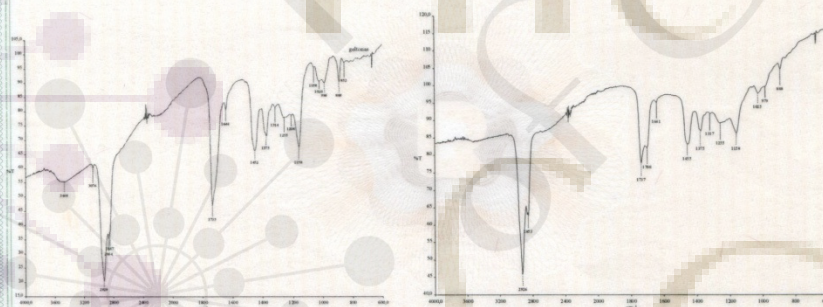


Figure Nr.1-2. FTIR spectra on left side represent brownish yellow natural amber from the Baltic Sea region.

FTIR spectra on right side represent heated greenish brown natural amber from the Baltic Sea region.



A. V./Seal

2013-10-25

Data / Date

Parašas / Signature

*Rimantas Rimas*  
R

Brangakmenių Ekspertė -  
Laboratorijos vadovė  
Rimantas Rimas

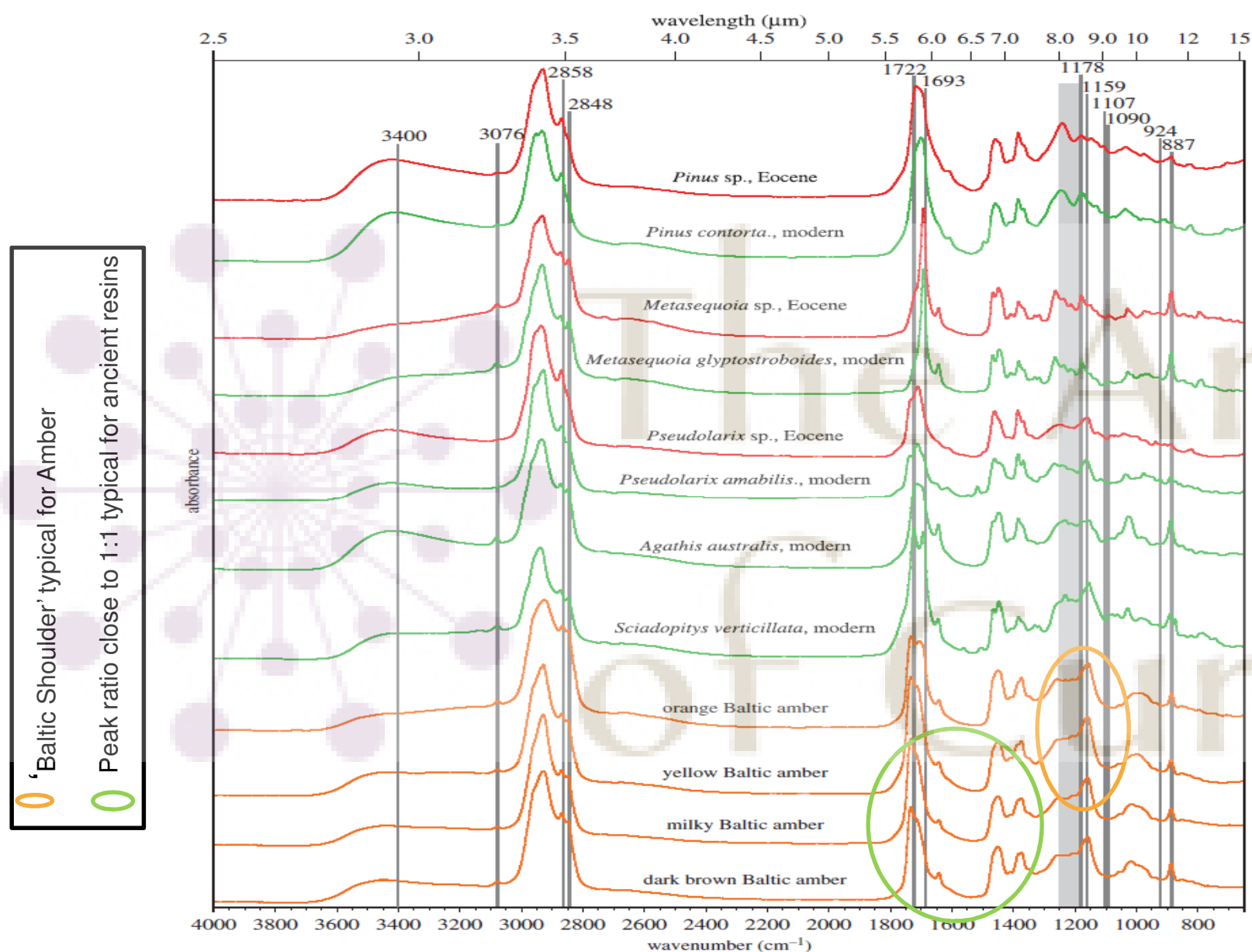


Figure 1. FTIR spectra of resins from selected modern and Eocene conifers and of Baltic amber. Vertical lines indicate spectral bands used to define the ratios subjected to cluster analysis (table 1). Shaded area is the Baltic shoulder, which is fully expressed in Baltic amber and *S. verticillata* and partially in *Pseudolarix*. Red, fossil resin; green, modern resin; orange, Baltic amber.

‘Baltic Shoulder’ typical for Amber

Peak ratio close to 1:1 typical for ancient resins

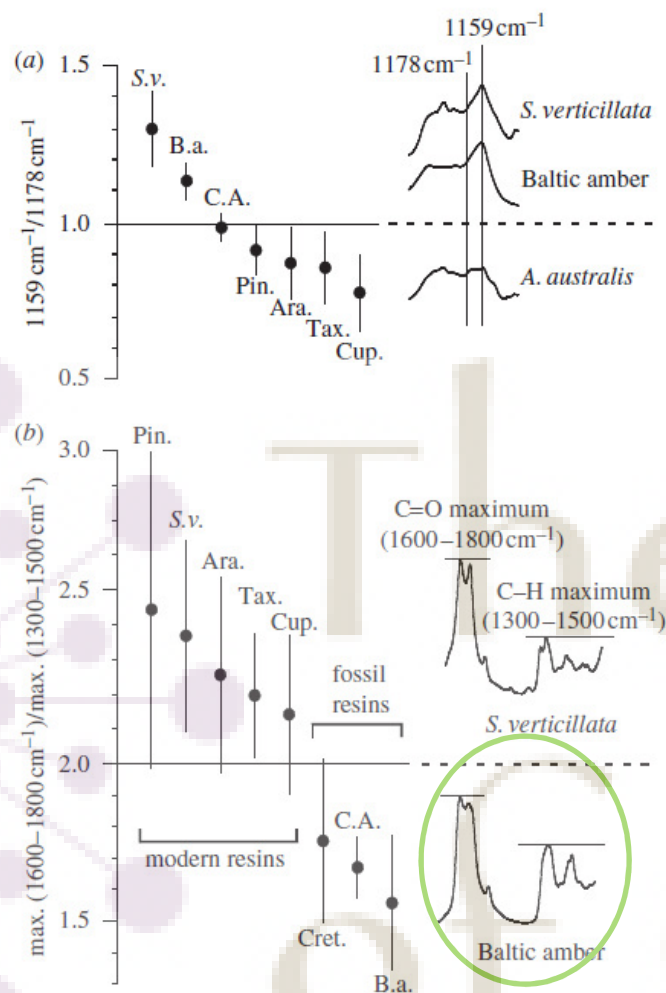


Figure 2. Examples of wavenumber ratios calculated from the FTIR spectral database. (a) The  $1159 \text{ cm}^{-1}/1178 \text{ cm}^{-1}$  ratio reflects the amplitude of the Baltic shoulder and is positive only for modern *S. verticillata* (*S.v.*) resin and Baltic amber (B.a.). This ratio is not overprinted strongly by diagenesis. (b) The ratio of maximum C=O absorbance to that of secondary C-H, in contrast, is controlled by oxidation history and retains no chemotaxonomic significance. Additional abbreviations are as follows: C.A., Eocene Canadian Arctic (all Giraffe and Buchanan Lake samples); Pin., Pinaceae; Ara., Araucariaceae; Tax., taxodioid Cupressaceae; Cup., cupressoid Cupressaceae; Cret., Canadian Cretaceous ambers from McKellar *et al.* (2008).



# Conclusions

- The 5 amber samples produced similar spectra with spectral peaks(bands) in the same area (lower intensity caused by lower concentration of amber in our pellet).
- These spectra are directly comparable to the certificates obtained from Lithuania.
- Are distinctly different from polystyrene spectrum.
- Physical behavior (crushing) is not consistent with glass.
- Slides 11,12 show spectra from enclosed paper on thorough research in distinguishing amber from other natural resins using FTIR.
- Ratio of band height in  $1700\text{cm}^{-1}/1500\text{-}1300\text{cm}^{-1}$  which is typically close to 1:1 for ancient resins
- And Baltic Shoulder typical for amber around  $1180\text{cm}^{-1}$  are indicated on the spectra and in the reference paper spectra.
- Based on these facts I do believe that we were provided authentic amber bracelets for analysis.