



MAD Lab Report 2006-13

**Tree ring dating of Mayfield House,
Guysborough, Nova Scotia**

By

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Table Of Contents

Abstract	2
Introduction	3
Sample Collection, Preparation, and Analysis	3
Scanning Electron Microscope Analysis	4
Crossdating	6
Conclusion	6

Abstract

In the summer of 2005 the MAD Lab was asked to date the age of the main structural timbers of the Mayfield house in Guysborough Nova Scotia (MAD Lab site code #05AXS000). Eighteen samples were extracted from the attic and basement beams of the structure. The samples were all determined to be balsam fir (*Abies balsamea*), which proved to be a difficult species to crossdate to regional records of growth. In the end, 15 of 18 samples could be crossdated once growth records from the Christ's Church in Karsdale, Nova Scotia were obtained by the Lab. The majority of the samples measured and crossdated in the study indicate that the range of cut dates of the wood are 1796-1800. These dates indicate that construction on the Mayfield House probably was initiated in the summer of 1800.

Introduction

The Mount Allison Dendrochronology Lab (MAD Lab) was contacted to process samples within a house in Guysborough Nova Scotia by Marion J. Mayfield. A MAD Lab team traveled to Guysborough on August 8, 2005 and extracted samples from the attic and basement of the structure. The structure is located across the street from the current wharf in Guysborough, NS (Lat. 45/23.477' N, Longitude, 61/29.883' W Latitude). The structure was thought to be one of the oldest in the town and for this reason, more exact information was sought about the structure by the Mayfield family.

The MAD Lab collected and processed increment core samples using standard dendrochronological methods to determine the age and ring measurements for the structure. The process was broken into five steps, 1) collecting the samples, 2) gluing and sanding the samples, 3) measuring the samples to extract a ring pattern of radial growth for each core, 4) defining the species of the wood within the structure, and 5) pattern matching (crossdating) the sample's ring record against existing base chronologies for the region.

Sample Collection, Preparation and Analysis

The Mayfield house was designated as MAD Lab site #05AXS000. In total 18 usable samples were collected from both the attic and basement of the structure. Thirteen samples were taken from planed or roughly hewn 4" x 4" logs in the attic (05AXS001-05AXS013), while only five usable samples could be collected from the raw logs of various dimensions from the basement due to extensive rot (05AXS014-05AXS018) (see Table 1.0).

The samples were collected using standard increment coring tools with a diameter of 5.1 mm. Samples were labeled and transported to the MAD Lab in clear plastic straws. Since the samples were dry, they were immediately glued into slotted mounting boards and prepared for sanding. The samples were sanded with 40, 80, 120, 220, 320, and 400 grit sand paper. The final sanding produced a smooth finish with a polished surface. The samples were buffed to remove sanding dust, and brought to the laboratory clean room for measurement.

The samples were measured on a WinDendro™ system by inverting and scanning the samples on a high-resolution scanner and collecting a digital image of each core. The samples were then analyzed by measuring the rings of each sample to 0.001 mm. Measurements were then converted to decadal format for further analysis.

Table 1.0 - Samples taken from the Mayfield House in Guysborough, NS.

Number	Location	Bark Condition	Species ID	Crossdated Interval
05AXS001	Attic	bark	balsam fir	1768-1800
05AXS002	Attic	remnant bark	balsam fir	1746-1799
05AXS003	Attic	bark	balsam fir	1770-1799
05AXS004	Attic	no bark	balsam fir	1748-1796

05AXS005	Attic	bark	balsam fir	1743-1800
05AXS006	Attic	remnant bark	balsam fir	1759-1796
05AXS007	Attic	bark	balsam fir	1776-1800
05AXS008	Attic	remnant bark	balsam fir	1737-1798
05AXS009	Attic	remnant bark	balsam fir	n/a
05AXS010	Attic	remnant bark	balsam fir	1748-1797
05AXS011	Attic	no bark	balsam fir	n/a
05AXS012	Attic	bark	balsam fir	1776-1800
05AXS013	Attic	no bark	balsam fir	1758-1791
05AXS014	Basement	remnant bark	balsam fir	1745-1799
05AXS015	Basement	remnant bark	balsam fir	1737-1798
05AXS016	Basement	bark	balsam fir	1691-1800
05AXS017	Basement	some bark	balsam fir	n/a
05AXS018	Basement	bark	balsam fir	1742-1800

Scanning Electron Microscope Analysis

The wood in the structure was old, so not every sample could be identified to species visually. Representative samples of the extracted cores were put through a scanning electron microscope (SEM) analysis to determine the species of the wood. When crossdating, it is important to pattern match each unknown sample against a dated sample of the same species to be sure to be incorporating the same signals between samples. To conduct the analysis with the unknown samples from the Guysborough house, small portions of the samples that were not needed for the ring analysis were used. Three different cuts of a microscopic wood sample are needed to perform a species diagnostic test on the unknown wood. For this reason, fresh cuts of three different directions (tangential, radial, and transverse) of the wood were made for all samples put through the SEM analysis.

Figure 1 and 2 display the results of some of the samples illustrating the rays and bordered pits of *Abies balsamea* (balsam fir). All samples checked in the SEM analysis turned out to be balsam fir, which matched very well with the samples that could be visually identified while on site in Guysborough.

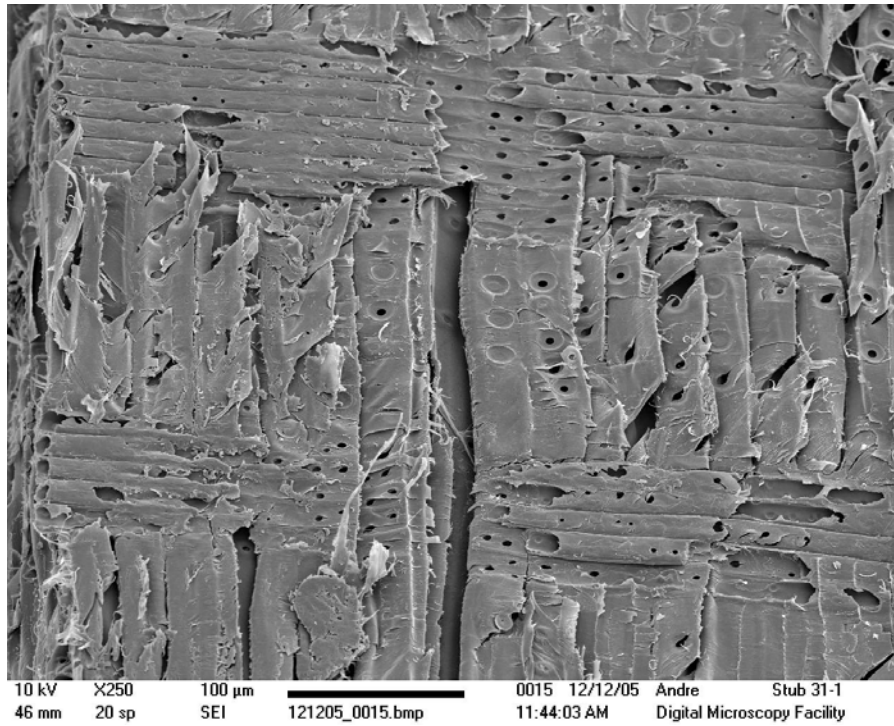


Figure 1 - A radial view of sample 05AXS017 from the basement of the Mayfield House. Displayed are rays lacking transverse tracheids, one of the diagnostic features distinguishing the species *Abies balsamea*.

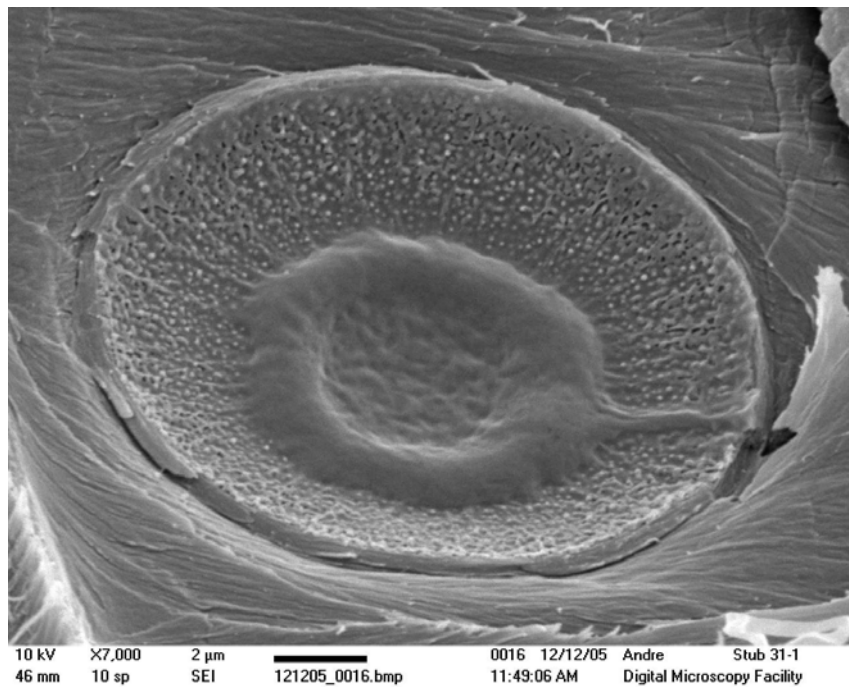


Figure 2 - A close up of a bordered pit from a radial view from sample 05AXS011 displaying some of the features needed to distinguish the wood as coming from balsam fir.

Crossdating

A thorough search of databases that may have contained growth records of other old balsam fir in the Guysborough region of Nova Scotia proved unsuccessful. No chronologies were found. Part of the reason for this predicament is that balsam fir growing naturally rarely grows older than 150 years and the samples in this structure were clearly older than any live trees that could be found. The data for the Mayfield house remained floating in time until dated samples from a Karsdale church (MAD Lab # 05CS000) were found late in 2005. Christ Church, located in Karsdale, NS, finally provided a data set that was locked in time that could be used to crossdate the Mayfield samples. The statistical program COFECHA was used to crossdate the floating samples into the Karsdale chronology. Most samples met the statistical threshold of 99% with dates for each sample listed in Table 1.0, and an example of a visual crossdate illustrated in Figure 3.

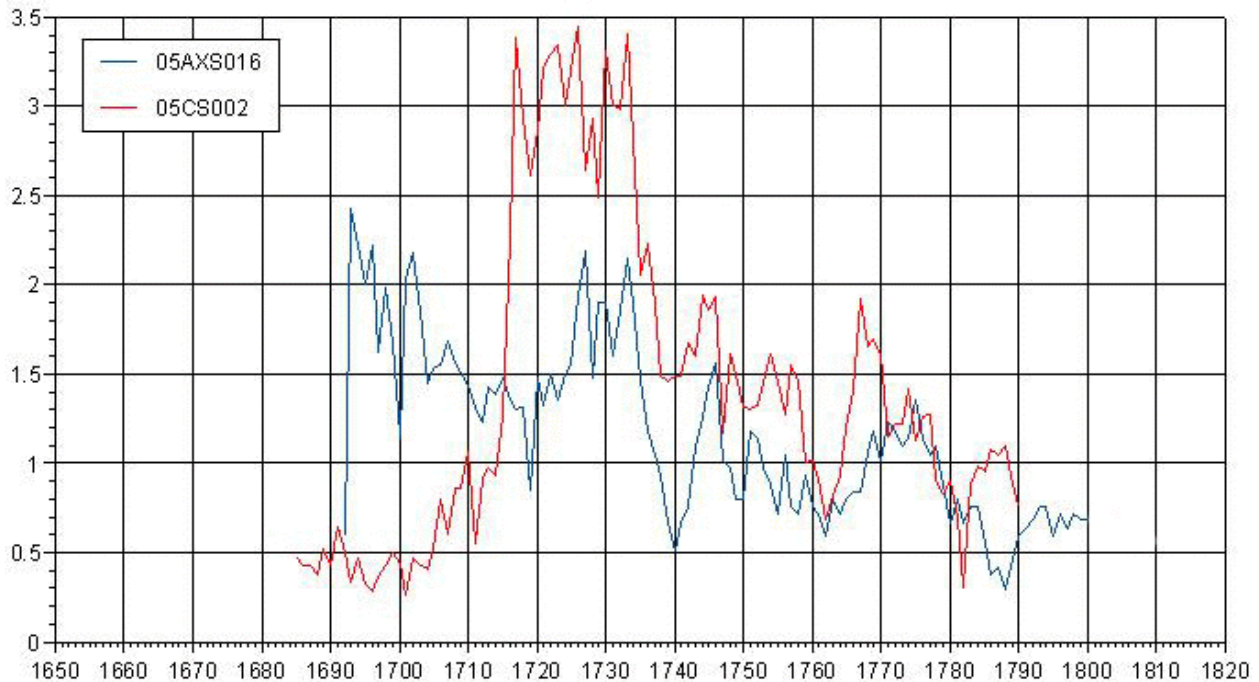


Figure 3 - Raw ring measurements from the Karsdale church and the measurements of sample #05AXS016 from the Mayfield House. Good statistical and visual agreement between the peaks and valleys in the series allows for a sound crossdate to be found.

Conclusion

The majority of the samples measured and crossdated in the study indicate that the range of cut dates of the wood are 1796-1800. The range of dates is consistent with logic when samples that have bark present are compared to those that almost have the bark present. These dates indicates that construction on the Mayfield House was probably initiated in the summer of 1800. The manner in which the timbers were notched in the basement and the mode in which the rafters were pegged together in the attic with hardwood dowels is consistent with other structures that were built at this time.