Mount Allison
Dendrochronology Lab

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Tree ring dating of the Almond Structures, Shigawake, Quebec

By

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Abstract

In the autumn of 2005 the MAD Lab was asked to date the age of the main structural timbers of the Almond house and the remaining timbers of a barn in Shigaiwake, Quebec (MAD Lab site code #05BQS000). Twenty samples were extracted from the attic and basement beams of the main house structure, and six from the barn. The samples were all determined to be red spruce (*Picea rubens*) in the attic and eastern white cedar (*Thuja occidentalis*) in the basement and barn. Both species proved to be a difficult to crossdate due to the lack of regional records of growth. In the end, 23 of 26 samples could be crossdated once growth records were pieced together from nearby Paspébiac and from the northeast shore of New Brunswick. The majority of the samples measured and crossdated in the study cluster around three dates. The range of cut dates of the wood in the attic cluster around 1827, the basement wood clusters around 1808, and 1832 for the remains of the barn structure. The construction dates for the buildings sections are probably one year after the harvest dates listed.

Introduction

The Mount Allison Dendrochronology Lab (MAD Lab) was contacted to process samples within a house in Shigawake, Quebec, by Paul Almond. A MAD Lab team traveled to Shigiwake on September 24, 2005 and extracted samples from the attic and basement of the main house structure, as well as a few samples from the remaining beams of a barn. The structure is located along highway #132 on the Gaspé Bay of Quebec (Lat. 48°05.651' N, Longitude, 65° 04.810' W Latitude). The structure was thought to be one of the oldest in the region and for this reason, more exact information was sought about the structure by the Almond 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 Almond house was designated as MAD Lab site #05BQS000. In total 20 usable samples were collected from both the attic and basement of the main structure. Ten samples were taken from planed or roughly hewn 4" x 4" logs in the attic (05BQS001-05BQS010)(Figure 1), while 10 usable samples were collected from the raw logs of various dimensions from the basement (Figure 2). Due to extensive rot in many of the basement logs, many of the cores were incomplete (05BQS011-05BQS020) (see Table 1). Samples from the barn remnants were gathered through increment coring as well as two disk specimens were collected via a saw, as the wood was exposed and permission was granted for destructive sampling (Figure 3).

Figure 1 - A view looking down the attic space above the older part of the house. The rafters in this section of the house were pegged together with wooden dowels and the beams were both sawn and rough hewn.

Figure 2 - A view of the basement beams below the older part of the house. The beams in this section of the house were notched together and flattened in palces by an adze.

Figure 3 - A sample being taken of one of the remaining barn beams. The footprint of the barn was clearly evident and some of the original structure remained sound enough to sample.

Table 1.0 - Samples taken from the Almond structures in Shigawake, PQ.

Number	Location	Bark Condition	Species ID	Crossdated Interval
05BQS001	Attic	bark	spruce	1769-**1827**
05ABQ002	Attic	remnant bark	spruce	1767-**1827**
05BQS003	Attic	bark	spruce	1776-**1827**
05BQS004	Attic	no bark	spruce	1778-**1827**
05BQS005	Attic	no bark	spruce	n/a
05BQS006	Attic	no bark	spruce	1756-**1827**
05BQS007	Attic	bark	spruce	1784-**1827**
05BQS008	Attic	bark	spruce	1770-**1826**
05BQS009	Attic	remnant bark	spruce	n/a
05BQS010	Attic	bark	spruce	1747-**1827**
05BQS011	Basement	bark	cedar	1688-**1807**
05BQS012	Basement	bark	cedar	1679-1806
05BQS013	Basement	no bark	cedar	1670-1799
05BQS014	Basement	wormwood	cedar	1602-1802
05BQS015	Basement	wormwood	cedar	1613-**1808**
05BQS016	Basement	bark	cedar	1615-1805
05BQS017	Basement	some bark	cedar	1642-**1807**
05BQS018	Basement	bark	cedar	1692-1806
05BQS019	Basement	wormwood	cedar	n/a
05BQS020	Basement	some bark	cedar	1710-1804
05BQS021	Barn/cookie	no bark	cedar	1514-1832
05BQS022	Barn/cookie	no bark	cedar	1641-**1843**
05BQS023	Barn	no bark	cedar	1719-1836
05BQS024	Barn	no bark	cedar	1699-1836
05BQS025	Barn	no bark	cedar	1649-1835
05BQS026	Barn	no bark	cedar	1708-1833

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.

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.

Scanning Electron Microscope Analysis

The wood in the structure was old and not all had bark, 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. In this way, the process guarantees to incorporate the captured signal of the climate between two samples. To conduct the analysis with the unknown samples from the Almond house, small portions of the samples that were not needed for the ring analysis were used. Three different cuts of a microscopic wood sample were needed to perform the species diagnostic tests 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 4 and 5 display the results of some of the samples illustrating a resin duct and a ray of spruce from Paspébiac and the Almond house . All samples checked in the SEM analysis turned out to be spruce.

Crossdating

A thorough search of databases that may have contained growth records of other trees in the Shigawake region of Quebec proved unsuccessful. No chronologies were found. Data for the Almond house remained floating in time until dated samples from Paspébiac (MAD Lab # 05BPS000) were established and verified in late 2005. The Paspébiac data finally provided information that allowed a crossdate with the Almond red spruce samples. The statistical program COFECHA was used to crossdate the floating samples into the Almond chronology from the attic of the main structure.

Eastern white cedar samples were crossdated from the nearest New Brunswick data set available in the MAD Lab database. The cedar master chronology was made up of living and structure wood available from Caraquet NB, and from the Havelock Highway site.

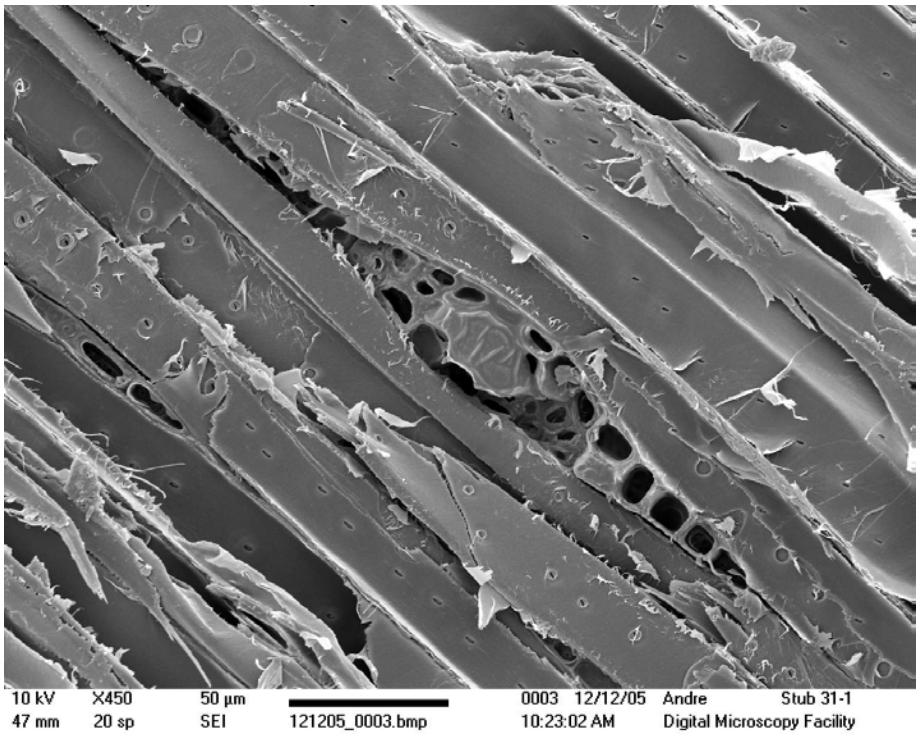

Figure 4 - A radial view of sample 05BPS000 from the Paspébiac banc. Displayed in the center of the image is a resin duct from a tangential view of the wood, one of the diagnostic features distinguishing the species *Picea rubens / Picea mariana*.

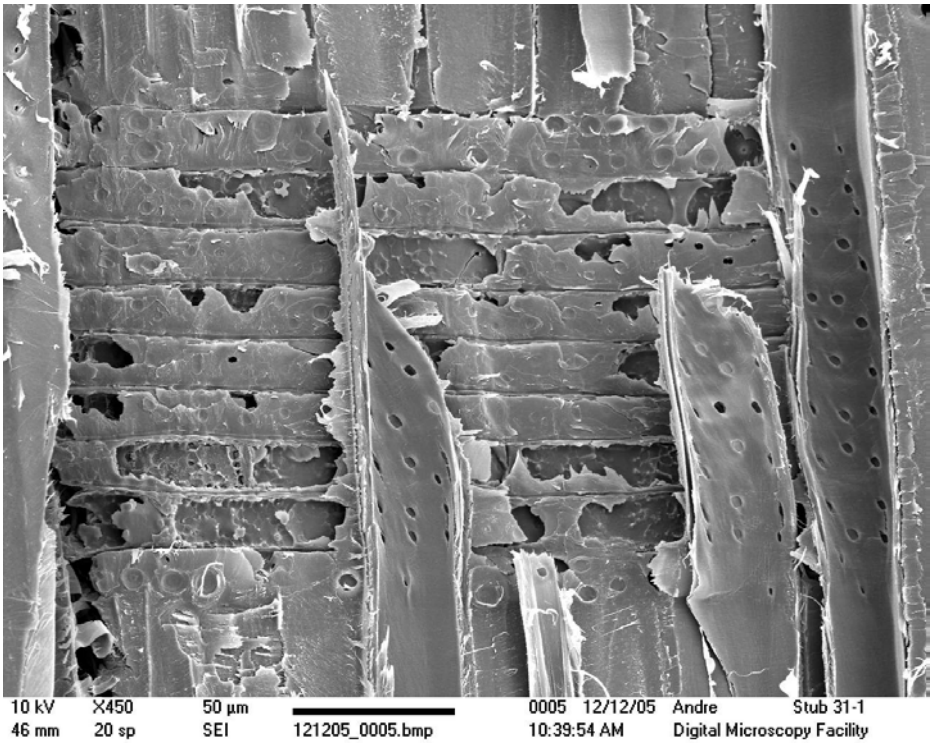

Figure 5 - A close up of ray cells in a radial view from sample 05BQS002 in the Almond attic. The image displays some of the features needed to distinguish the wood as coming from red spruce (*i.e.*, ray tracheids, height of rays).

Conclusion

The majority of the samples measured and crossdated in the study indicate that the range of cut dates of the wood cluster into three dates. The clearest signal was seen n the attic wood where all of the dates were either from 1826 or 1827. For this reason, it is logical to presume that the attic structure was built in 1828 as was typical of the construction practices of the day.

The original cedar beams in the basement of the house cluster on or slightly before 1808. Because cedar is so resistant to rot, often times the early-1800s construction practice was to collect downed wood to use in a building, as the wood was still in good structural condition. This practice saved valuable time, as the wood was easier and more efficient to collect. This construction practice could be the case in the Almond house as perimeter dates are all from with the decade preceding the 1808 year of the earliest dated sample crossdated. In either case, the most probable date of this part of the house was in the summer of 1808 or 1809.

The final structure sampled was the remains of the barn. Although no samples had the outer most perimeter wood present, the final year of the earliest crossdated sample came from the early 1840s. Again as the barn samples were all cedar, a wide range of dates in the preceding decade establish a probably time frame, but perhaps not an exact date of construction. The earliest date established of 1843 would put construction shortly after in 1844.