

Dendrochronology of the Yates House, Schenectady
(Schenectady County), New York

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The dendrochronological analysis of wood samples from the many phases of building in the Yates House gave three construction dates spanning the 18th and 19th centuries. The original house (southwest section with outer walls facing Union Street to the south and the yard of the First Reformed Church of Schenectady to the north) was built in late 1727 or a few years later; the “Victorian” section, (southeast section, facing Union Street) was built in 1748; and the third section to the north of the original section was built in or after 1835.

Twenty one cores and two sections were collected from 8 beams, 4 floor joists, and one loose post in the basement in November 2007 with the help of Ronald Kingsley of Schenectady County Community College by Carol and Bill Griggs, and Sturt Manning, director of the Cornell Tree-Ring Lab. Samples were cored from seven beams in the oldest section of the basement; from two floor joists and a loose post in the “Victorian” section, and from 1 beam and two joists in the third basement section. We also took a quick look at the posts and rafters in the attic, but agreed that we could make another visit if attic samples were needed for more accurate dates.

Since the samples are from timbers used or added in several construction phases across both the 18th and 19th centuries, a higher number of species is represented than in most of the other houses included in our Schenectady area collection. The earliest basement beams are oak (*Quercus* sp.) and pitch and white pines (*Pinus rigida* and *P. strobus*, respectively); the “Victorian” joists plus the loose post are all of pitch pine; and the joists and beam in the later addition are hemlock and spruce (*Tsuga canadensis* and *Picea* sp., respectively).

Methods:

At the lab, cores were glued onto core mounts and all samples sanded down to be able to clearly see the rings. The ring-widths were measured under a microscope on a moving table. The patterns in the ring-widths of samples of the same species were compared to each other, focusing on their sources (original, Victorian, and second basements). When two samples’ patterns matched securely (= “crossdated”), they were combined into sub-chronologies. Each sub-chronology was then compared with other sub-chronologies and the other single samples, using both statistical tests and visual comparisons, until all securely-crossdated samples had been combined into chronologies according to species and their location in the buildings. Then the chronologies of the pitch pine were combined and that and the other species chronologies were compared to the same species’ securely-dated historic and forest site chronologies from upstate New York and New England to place them correctly in time.

Results and conclusions:

The original basement beams that we sampled, including the cellar plate, consist of oak (three beams and the plate), with one beam of pitch pine nearest to the street. A core was also taken from one joist of white pine. Two of the oak beams still contain bark or a waney edge (= only bark was removed so outer ring represents last year of growth), but their sapwood rings were in such poor condition that the drilling destroyed at least a few of the outermost rings in the samples. The outer ring of the sample from the second beam from the south wall, a pitch pine (SYH-1) was similarly a close-to-outer ring, possibly a waney edge. The close-to-outer rings, presence of bark, and sapwood count of the oaks and pine beams indicate that the trees for the original building were felled at the earliest in late 1727 and possibly a year or two later. The house would have been built soon after the trees were felled; 1727-1728 is this section's most probable building date, it certainly was not built earlier. The sample SYH-3 from the joist closest to the street is of pitch pine and has too few rings to date, but the difference in its size and surface characteristics suggest that it was added later. The short sequence of ring-widths in the one white pine sample (SYH-2) is not datable at present, but that beam is also likely an addition, possibly added whenever the fireplace was removed. It is the only beam perpendicular to, and below, the other beams in the original section.

The known history of Schenectady and historic maps have indicated that this house was possibly one of the first houses built in Schenectady, vying for that position with the Brouwer House and others; all this has caused a lot of speculation about the possibility of a late 1600s date, and which one is older. The architecture and wooden components, however, of both Yates and Brouwer indicate that they were more likely built in the early part of the 18th century. Here, the dendrochronology of the samples indicate that the original Yates house was most likely built in 1727-1728, which was soon after Yates' marriage (<http://www.schenectadyhistory.org/buildings/schenectady/y.html>). We have also found that the oldest part of the Brouwer House was built in 1730, a few years later (our Brouwer House Report is forthcoming, Mach 2009). In any case they are essentially of the same age, but with English vs. Dutch architectural styles, respectively.

The dates of the two samples from joists in the "Victorian" addition to the east of the original building, indicate that that portion actually was constructed in summer 1748 (SYH-8's contains bark and its outer ring is partial only). The Victorian style of the first floor of has to have been due to a remodeling over a century later. The two samples are both pitch pine and are from the same tree.

The beams in the third section, to the north of the two dated sections but south of the final (unsampled) addition to its north, are two species that only started being used for construction purposes in this area in the 19th century – hemlock and spruce. The outermost ring of the hemlock is 1835, a complete ring with a possible waney edge, thus the construction would have been done late in 1835 or after that. The outer rings of both samples are close to each other in time, so that even without a true waney edge, the 1835 building date is still most probably within 5 years (from 1835 - 1840). The perpendicular beam running N-S below the others is a spruce log (SYH-12), and its outer ring dates to 1757 with no waney edge. The

smallness of its rings indicates that many decades of rings could have been removed when it was squared, and it is impossible to say when this tree was felled. It was probably cut down along with the hemlocks because both their ring sequences closely match patterns in the spruce and hemlock chronologies, respectively, of trees growing in the Adirondack Mountains. By 1835 logs from that region were widely distributed across New York via the rivers and canal system.

These results show that the three construction phases of the main parts of the building are sometime in late 1727-1728 for the initial construction; 1748 for the addition of the now-Victorian section; and 1835 or after for the third section to the north of the original house. The sections that are to the north of the third section today had to have been added later, after the ca. 1835 construction.

The lengths of the tree-ring sequences, and the dates of the samples and the chronologies built of those samples, are listed below. The ending year (in bold below) and the nature of the outer ring in each sequence is the key to the date of the felling of the trees and the subsequent building date of each phase. Their ring counts and beginning dates merely indicate the span of years that the trees grew before they were cut down.

Definitions of terms used in the following lists: B= bark present; W= only bark removed (“Waney edge”); v = very close to bark; vv = unknown number of rings missing; p = pith (center of tree) present; +p = pith absent but close to innermost ring; n+ or +n = incomplete or unmeasured ring(s) present before or after measured ring sequence.

For the oak sapwood count, there are generally between 5 and 20 sapwood rings in oaks; 7-13 is the most normal range. If sapwood rings are present, but no bark, then we extrapolate for a more exact felling and building date using the 7-13 year range. The sapwood in the *Pinus rigida* samples in our collection contain anywhere from 45 to 100 rings.

<u>Description</u>	<u>Ring Count</u>	<u>AD Dates</u>
Original house, built in late 1727 or after, most likely within two years:		
Three oak beams with full sapwood	1+116+1v	1609- 1726+v
Pitch pine beam with waney edge	1+112v	1615- 1727v
White pine joist, running N-S	1+76+1vv	not dated
Second construction, now the “Victorian” section, built in 1748:		
Two pitch pine joists, with bark	1+181+1B	1566- 1748+B
Loose pitch pine post on floor, no sapwood	+p+1+116+1vv	not dated
Third section, to north of the other two, built sometime after 1835:		
Two E-W hemlock joists	1+174v	1661- 1835v
Spruce beam, running N-S	+p+1+108+1vv	1648-1757+vv

Description

Ring Count

AD Dates

The Yates House Chronologies – the years represented by the tree-rings:

Yates House Oak Chronology (3 samples)	116	1610-1725
Yates House Pitch Pine Chronology (3 samples)	181	1567-1747
Yates House Hemlock Chronology (2 samples)	174	1662-1835
Yates House Spruce Sample	108	1649-1756

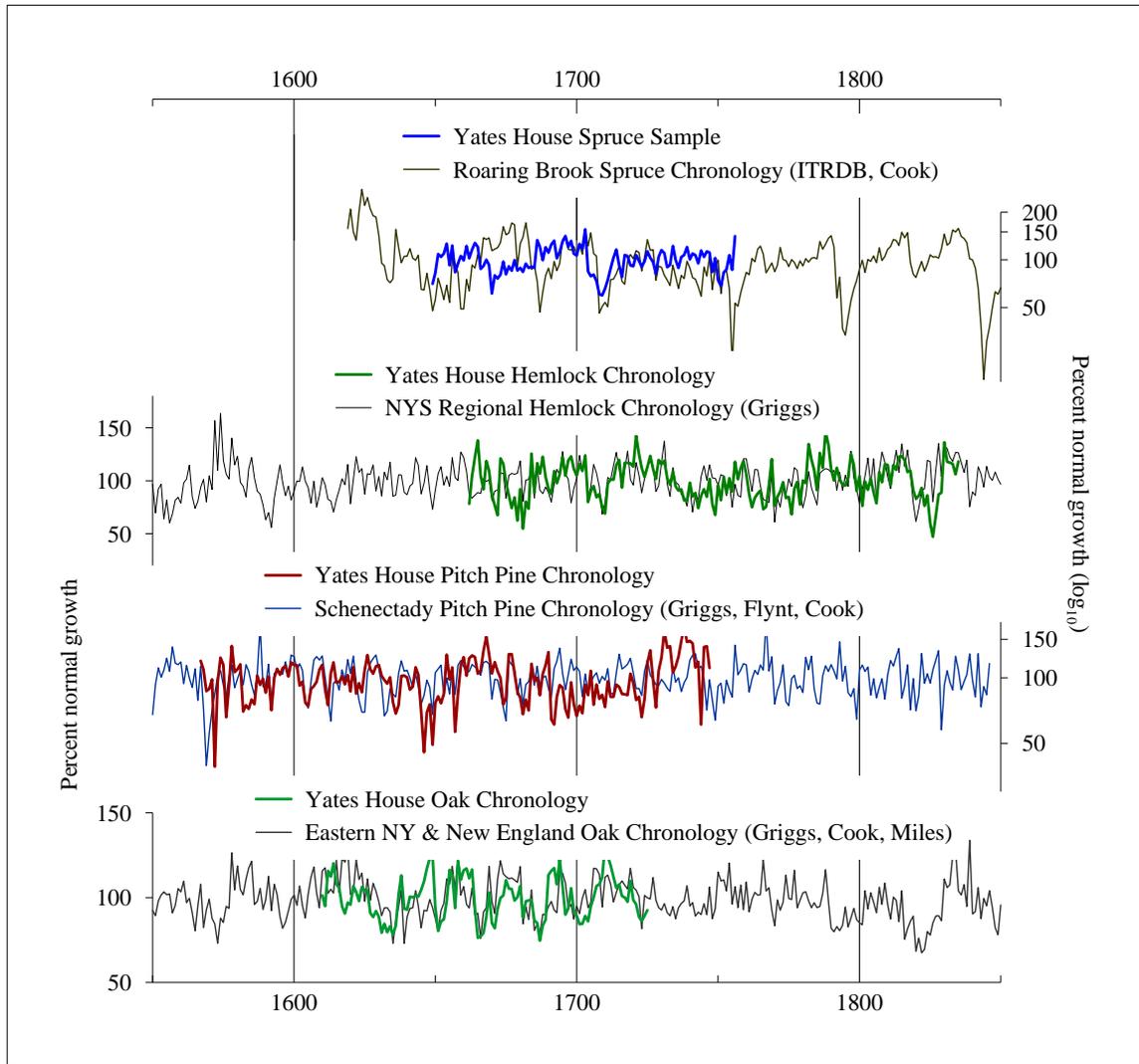


Figure 1. Here are each species' sample or chronology compared to the site or regional chronology used to place them in time. The Y-axes are the percent normal growth which is calculated by removing the normal decrease in ring-widths over the lifespans of the trees. The calendar dates of the Yates House samples were assigned by these comparisons. The statistical tests used to place these in time are listed below.

Below are the statistics supporting the AD dates. All are significant at the 0.05 level of probability.

		Students <i>t</i> -score	Correlation Coefficient	Trend Coefficient	Overlap
Yates House	versus:				
Oak Chronology	E NY & New England Oaks	7.29	0.56	68%	117
Pitch Pine Chronology	Schenectady Pitch Pines	5.94	0.41	70%	181
Hemlock Chronology	NYS Regional Hemlock	9.44	0.58	65%	174
Spruce Sample	Roaring Brook Spruce	5.16	0.45	64%	108

Appendix: A list of the individual samples: from where they were collected, their ring count and their tree-ring dates, if established:

<u>Sample Number</u>	<u>Description</u>	<u>Number of rings</u>	<u>Absolute Dates</u>
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SYH-

Original construction (southwest section):

- | | | | |
|---|---|----------------|---------------|
| 1 | Partially squared E-W beam, 2 nd from south wall. F.H. core, <i>Pinus rigida</i> . | N= +p+1+112+1v | 1615+p-1728v |
| 2 | Partially squared N-S beam, only N-S beam in this section. F.H. core, <i>Pinus strobus</i> , some sapwood. | N= 1+76+1v | Not dated |
| 3 | Squared E-W beam, between SYH-1 and south wall, but substantially smaller than both the SYH-1 beam and the cellar plate. F.H. core, <i>Pinus rigida</i> . | N= 1+19+1vv | Too few rings |
| 4 | Partially squared cellar plate beam above south basement stone wall. F.H. core, <i>Quercus</i> sp. 9 sapwood rings. | N =+p+1+114v | 1611-1725v |
| 5 | Squared E-W beam, north of removed cellar fireplace. F.H. core, <i>Quercus</i> sp. 15 sapwood rings. | N=+1+116+1v | 1609-1726+v |
| 6 | Squared E-W beam, next beam north of SYH-5. F.H. core, <i>Quercus</i> sp. 4 sapwood rings. | N= 1 +76+1vv | 1640-1717+vv |
| 7 | Squared E-W beam, next beam north of SYH-6, F.H. core, <i>Quercus</i> sp. 4 sapwood rings. Tentatively date only – a short sequence. | N= 1+27+1vv | 1691-1719+vv |

<u>Sample Number</u>	<u>Description</u>	<u>Number of rings</u>	<u>Absolute Dates</u>
SYH-			
“Victorian” section (southeast section):			
8	Partially squared N-S floor joist, 3 rd from east wall. F.H. Core, <i>Pinus rigida</i> . Same tree as SYH-9, contains sapwood and bark	N=+p+1+181+1B	1566-1748+B
9	Partially squared N-S floor joist, 5 th from east wall. F.H. Core, <i>Pinus rigida</i> . Same tree as SYH-8.	N= 1+64+1vv	1600-1665+vv
10	Loose post lying on the floor in this section. Section, <i>Pinus rigida</i> .	N= 1+116+1vv	Not dated

Third section, on the north side of original section:

11	First floor E-W joist, 3 rd from stairs on north side of this section. F.H. core, <i>Tsuga canadensis</i> .	N= 1+174v	1661-1835v
12	N-S cross-beam between sections of joists. F.H. core plus section cut off from the south end; <i>Picea</i> sp.	N=+p+1+108+1vv	1648-1757+vv
13	First floor joist, 7th from stairs on north side of this section. F.H. core. <i>Tsuga canadensis</i> . Outer rings crushed.	N= 1+119+13v	1661-1829++v

Analysis was done at the Cornell Tree-Ring Lab, Cornell University, Ithaca, NY (visit website <http://dendro.cornell.edu/> for more information).