Tree-Ring Dating of the LeFevre House New Paltz, New York

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Introduction

The Lefevre House is one of Historic New Paltz's larger brick and timber frame building. It is also the most contemporary building dated thus far by dendrochronological methods. In this regard the LeFevre House represent a valuable contribution to the construction of a New Paltz, Oak Master Dating Chronology (NPOMC). Prior to the examination of the LeFevre House the temporal coverage of the previous NPOMC spanned the period of 1449 (Jean Hasbrouck) to 1739 (Cahn House). New tree-ring information from the Oak timbers in the LeFevre House have added an additional 60 years to extant NPOMC producing a new 250 year master chronology covering the years 1449 to 1799. Thus, the information recovered from the LeFevre House represents a significant contribution to the overall development of the Lower-Hudson, Oak Master Dating Chronology.

By comparison to other buildings in New Paltz buildings, so far examined by dendrochronological methods, the LeFevre House was the very well preserved. By far the construction timbers within its walls have provided the most "datable" samples. Only three, out of 18, samples were undatable, representing a remarkable 80% successes rate! Another significant aspect of the LeFevre House dating is the strong coherency in dates provided by the samples examined. Half of all samples that were successfully dated returned the same death date of 1799. Of the remaining eight dated samples, five had death dates within five years of the 1799 date. Only one sample, LF18 (from the south east corner of the basement) provided a radically young date of 1737, but this was obviously due to the loss of material from the sampling process. Clearly the relatively young age of this building, and its fine conservation, have contributed to the success of its dating.

Methods

Dendrochronology is the science of dating and analyzing annual growth rings in trees. Its first significant application was in the archaeological dating of the ancient Indian pueblos of the southwestern United States (Douglass 1921, 1929). Andrew E. Douglass is considered the "father" of dendrochronology, and his numerous early publications concentrated on the application of tree-ring data for archaeological dating. Douglass established the connection between annual ring width variability and annual climate variability, which is responsible for the establishment of precisely dated wood material (Douglass 1909, 1920, 1928; Stokes and Smiley 1968; Fritts 1976; Cook and Kariukstis 1990). Since 1921, dendrochronological methods, first developed by Douglass, have been perfected and employed throughout North America, Europe, and much of the temperate forest zones of the globe (Edwards 1982; Heikkenen and Edwards 1983; Holmes 1983; Stahle and Wolfman 1985; Krusic and Cook 2001). In Europe, where the dating of buildings and artifacts is as much a profession as a science, the history of tree-ring dating is tremendous (Baillie 1982; Eckstein 1978; Eckstein 1984).

During the fall of 2003, Paul J. Krusic, Dorji Dukpa and William J. Callahan visited the LeFevre House and conducted the dendrochronological sampling that is the basis of this report. The procedures we followed were identical to those used to successfully date the Jean Hasbrouck House, the Abraham House, the Terwilliger House, the DuBois Fort and the Cahn House. A total of 18 oak cores were collected from the hardwood framing timbers in both the attic and basement of the house, with the most coming from the basement (see **Figure 1**).

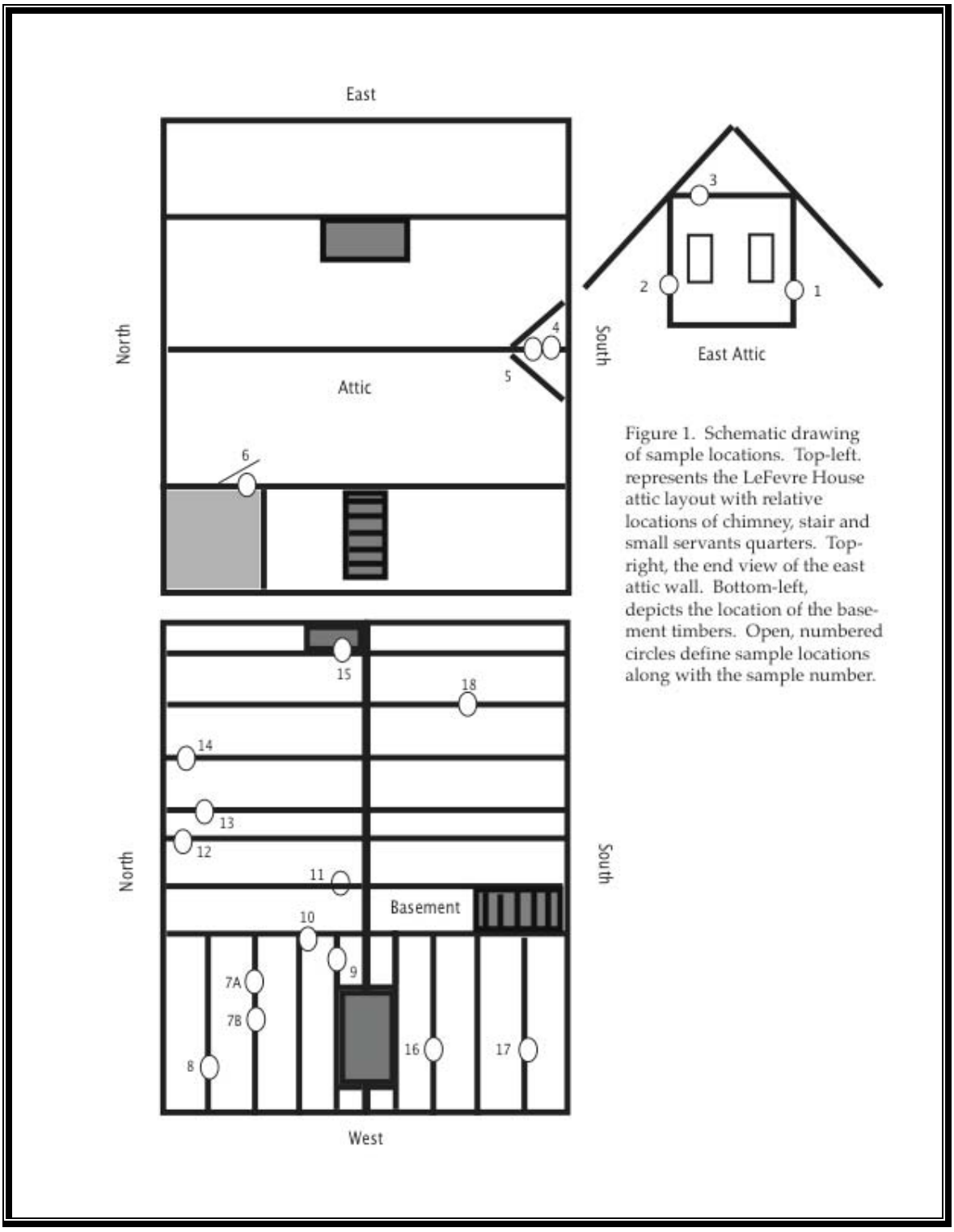


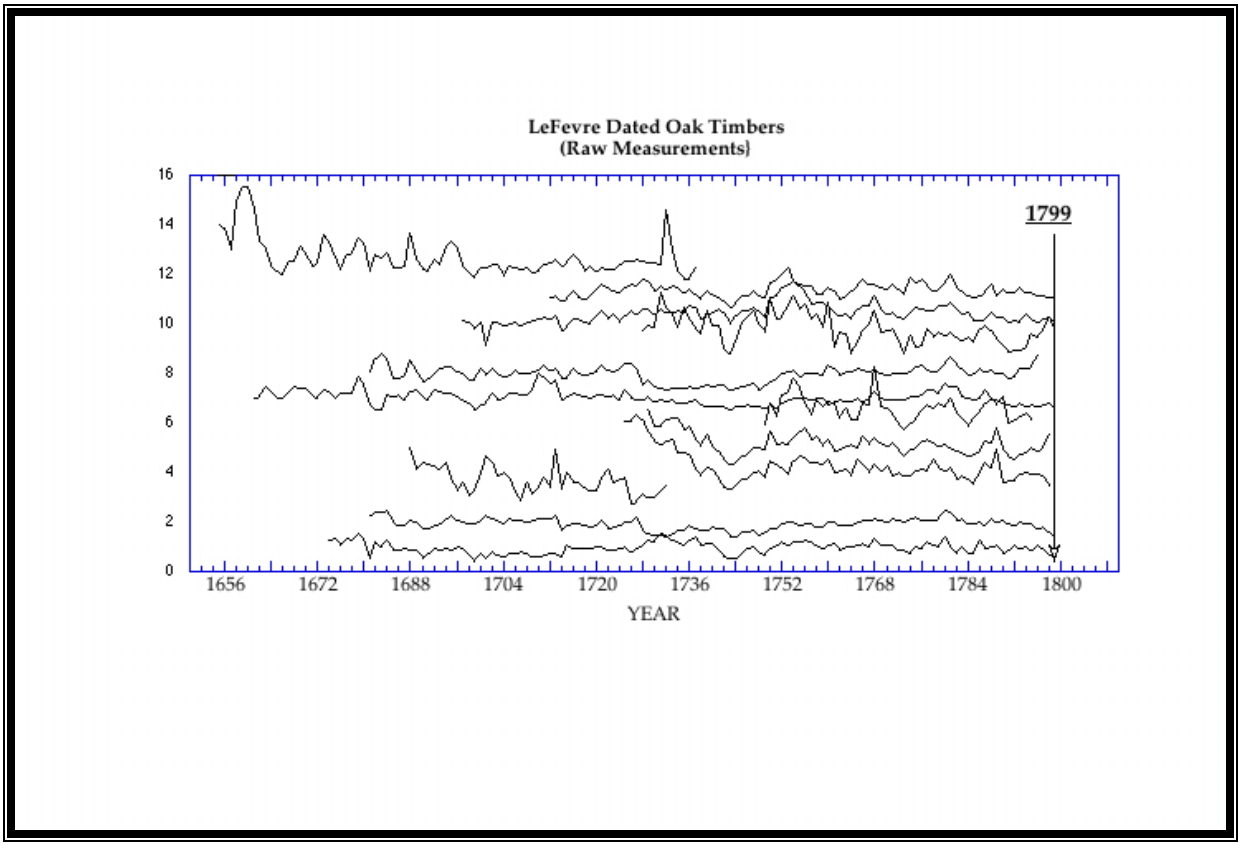
Figure 1. Schematic drawing of sample locations. Top-left. represents the LeFevre House attic layout with relative locations of chimney, stair and small servants quarters. Top-right, the end view of the east attic wall. Bottom-left, depicts the location of the basement timbers. Open, numbered circles define sample locations along with the sample number.

The wood samples were processed following well-established methods of dendrochronology. They were taken to our Tree-Ring Lab where they were carefully glued onto grooved mounting sticks. The wood cores were than sanded to a high polish to reveal the annual tree rings clearly. The rings were than measured to a precision of ±0.001 mm. The actual cross-dating procedure involved the use of a

computer program called COFECHA (Holmes 1983), which uses a sliding correlation method to identify probable cross-dates between tree-ring series. Experience has shown that this method of cross-dating is superior to that based on the skeleton plot method (Stokes and Smiley 1968) for oaks growing in the northeastern United States. It is also very similar to the highly successful CROS program used by Irish dendrochronologists to cross-date European oak tree-ring series (Baillie 1982).

COFECHA was used to first establish internal or relative cross-dating among the framing timbers. This step is critically important because it locks in the relative positions of the timbers with each other and indicates whether or not the dates of specimens with outer bark rings are consistent. Once internal dating is confirmed the new cross-dated series are cross-dated against independently established tree-ring chronologies from extant old living trees and archived, historical tree-ring material to assign precise annual calendar years to each samples measurements (see **Figure 2**). All of the "dating masters" used are completely independent of the samples taken from the LeFevre House.

Figure 2. Final cross-dated LeFevre Oak samples. Values of ring-width dimension (y-axis) have been adjusted to display the information clearly.



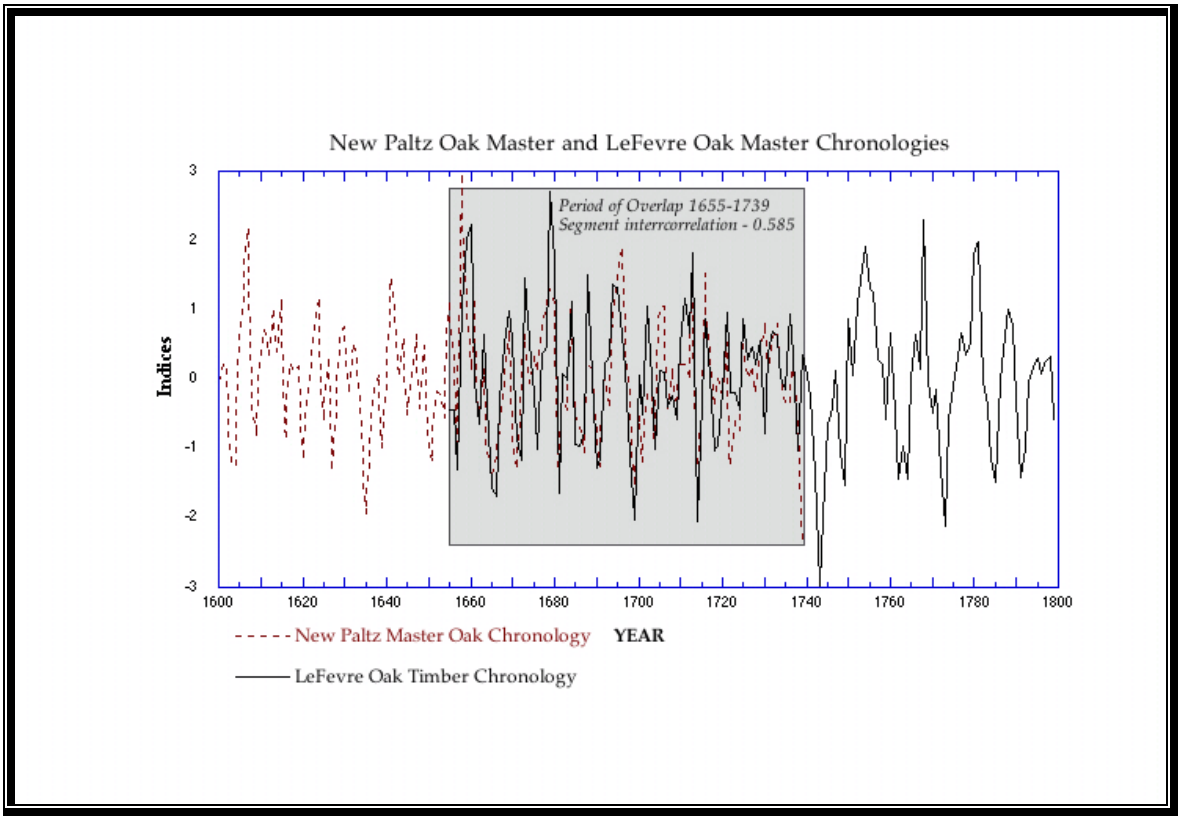
The results of the independent dating of individual LeFevre house samples is summarized in **Table 1.**, and visually shown in **Figure 2**. The dating of LeFevre timbers was relatively straightforward with a singular exception. Due to the relatively small differences between the last year of measure (LYOM) of the previous NPOMC and the First year of measure (FYOM) of the LeFevre House samples, the amount of overlap between the New Paltz Oak Master Dating Chronology and any individual LeFevre House sample was unusually small (20-30 years) and biased towards the later portion of the NPMOC. To confirm precise dating an additional test was performed.

Table 1. List of samples collected with their First Year of Measure (FYOM), there Last Year of Measure (LYOM), and the number of years measured rings (AGE).

Series ID	FYOM	LYOM	AGE
LF01	1725	1799	75
LF02	1681	1799	119
LF04	1725	1798	74
LF05	1729	1798	70
LF06	1749	1795	47
LF07A	1669	1789	121
LF08	1661	1799	139
LF09	1681	1796	116
LF10	1727	1793	67
LF11	1728	1799	72
LF12	1723	1793	71
LF13	1655	1799	145
LF15	1697	1799	103
LF16	1674	1799	126
LF17	1712	1799	88
LF18	1655	1737	83

Once again the program COFECHA was used to define the statistical significance of the independent dating derived for the individual samples. In this second examination all the LeFevre House samples were used to build a temporary "LeFevre House" chronology. This temporary, LeFevre chronology was compared to the extant NPOMC to validate the correct positioning, in time, of the two chronologies (**Figure 3**). The statistical results of this comparison are given in **Table 2**.

Figure 3. Detailed analysis of the common period between the extant New Paltz Oak Master Chronology and a composite LeFevre House Oak Chronology.



Conclusions one may draw from this second examination of the data only confirm what was shown earlier in the independent sample dating experiment. The significance of the correlation for the period in common is remarkably high and clearly seen in **Figure 3**. Partitioning the common period into three overlapping segments, delving deeper into the details of the comparison, provided correlations as high as 0.80! (see **Table 2**). This is remarkably good and confirms the felling date of 1799.

Results

Results from the dendrochronological examination of construction timbers, sampled in the LeFevre House, New Paltz New York reveal a precise date of 1799. There is no question that this is the year trees were felled to shape into timbers for building the house. Thus the LeFevre House just makes it under the wire as an 18th

century home. One could argue occupants did not inhabit the house until the 19th century, but that is another story.

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