Dendrochronological Analysis of the Johannes van Ostrande/ Johannes Radliff House Albany, New York

Dr. Edward R. Cook
and
William J. Callahan

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Introduction

This is the final report on the dendrochronological analysis of the structure known (variously) as the Johannes van Ostrande/ Johannes Radliff House (sometimes, Jared Holt/Saul building), located at 48 Hudson Avenue, Albany, New York 12207. In an effort to confirm the construction history of this house the owner, Orion Enterprises LLC. under the direction of Mr. Kevin Parker and Mr. Brian Parker, requested that dendrochronologists William Callahan and Dr. Edward Cook perform a tree-ring analysis of its structural timbers. The Ostrande/Radliff House is being listed on the New York State Register of Historic Places, and will soon be listed on the National Register of Historic Places. Application has been submitted to place the Ostrande/Radliff House on the City of Albany Historic Registry.

Together with Mr. Brian Parker, Callahan visited the house on 21 April, 2006, and collected wood core samples for the dendrochronological analysis of the timbers. Of the 14 samples acquired and analyzed, 13 were pine (Pinus sp.). The 14th sample was of oak (Quercus sp.). Every effort was made on site to locate bark or waney edges on the sampled timbers in order to ascertain an absolute cutting date, or dates, of the trees used in the construction.

Dendrochronological Analysis

Dendrochronology is the science of analyzing and dating annual growth rings in trees. Its first significant application was in the dating of 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 to archaeological dating. Douglass established the connection between annual ring width variability and annual climate variability which allows for the precise dating of wood material (Douglass 1909, 1920, 1928; Stokes and Smiley 1968; Fritts 1976; Cook and Kariukstis 1990). The dendrochronological methods first developed by Douglass have evolved and been employed throughout North America, Europe, and much of the temperate forest zones of the globe (Edwards 1982; Holmes 1983; Stahle and Wolfman 1985; Cook and Callahan 1992, Krusic and Cook 2001). In Europe, where the dendrochronological dating of buildings and artifacts has long been a routine professional support activity, the success of tree-ring dating in historical contexts is noteworthy (Baillie 1982; Eckstein 1978; Bartholin 1979; Eckstein 1984).

The wood samples collected from the John Radliff/Ostrande House were processed in the Tree-Ring Laboratory by Dr. Edward Cook following well-established dendrochronological methods. The samples were carefully glued onto grooved mounts and sanded to a high polish to reveal the annual tree rings clearly. The rings widths were measured under a microscope to a precision of ±0.001 mm. The cross-dating of the obtained measurements utilized the COFECHA computer program (Holmes 1983), which employs a sliding correlation to identify probable cross-dates between tree-ring series. In all cases, the robust non-parametric Spearman rank correlation coefficient was used for determining cross-dating. Experience has shown that for trees growing in the northeastern United States, this method of cross-dating is superior to the traditional skeleton plot technique (Stokes and Smiley 1968). It is also very similar to the highly successful CROS program employed by, for instance, Irish dendrochronologists to cross-date European tree-ring series (Baillie 1982).

COFECHA is used to first establish internal, or relative, cross-dating amongst the individual timbers from the site. This step is critically important because it locks in the relative positions of the timbers to each other, and indicates whether or not the dates of those specimens with outer bark rings are consistent. Subsequently, the internally cross-dated series are each compared with independently established tree-ring master chronologies compiled from living trees and dated historical tree-ring material. All of the "master chronologies" are based on completely independent tree-ring samples.

In the Ostrande/Radliff House study, regional composite master dating chronologies from living trees and historical structures in the Hudson Valley region were referenced primarily. All dating results were verified finally by comparison with independent dating masters from surrounding areas in New York, New Jersey, Massachusetts and central Pennsylvania. In each case, the datings as reported here were verified as correct.

Results and Conclusions

The results of the dendrochronological dating of the Ostrande/Radliff House timbers are summarized in **Table 1** and **Figure 1**. A total of 13 pine and 1 oak samples were analyzed in the laboratory, with 7 pine samples providing firm dendrochronological dates. In most cases when no date was forthcoming, the limited number of rings in the samples precluded dating with any statistical certitude.

To achieve these datings required attention during analysis to the previously recorded structural context of the samples (see **Table 1**). The contextual association of samples from within the house, the redundancy of the indicated relative cross-datings, and the eventual existence of sapwood and bark/waney edges demonstrating cutting year, provides the essential constraints necessary for establishing cross-dating, both within a site and with absolute chronological masters.

The strength of the cross-dating of the samples is indicated by the Spearman rank correlations in the seventh column ("CORREL") of **Table 1**. These statistical correlations, produced by the COFECHA program, indicate how well each sample cross-dates with the mean of the others in the group. The individual correlations vary slightly in statistical strength, but all are in the range that is expected for correctly cross-dated timbers from buildings in the eastern United States. Of the 7 pine samples that cross-dated well between themselves, and also dated well against the local oak historical dating master (see **Table 1**, column 6), 5 had absolutely verifiable bark edge at the time of sampling. Microscopically in the laboratory, 4 were determined to have complete growth rings in their cutting years.

From the datings that were achieved, there emerged firm evidence of one intrinsic construction period that produced the Ostrande/Radliff House. The absolutely dated bark-edged samples (JRHANY01, JRHANY02, JRHANY06, JRHANY11), taken from the cellar and 1st floor areas, indicate a construction phase for the Ostrande/Radliff House shortly after the end of the growth season 1728 (that is, 4 of the trees were cut during dormancy after the end of the growth season, late in the autumn of 1728 or immediately before the beginning of the growth season of the spring of 1729, i.e., approximately November 1728 through February 1729), with very strong redundant evidence from the other 3 dated pine timbers. Close *in situ* inspection of the timbers indicated that the materials were utilized very soon after cutting, in keeping with historical woodworking and carpentry techniques. It is therefore highly likely that construction of the sampled structural units took place during 1729, or, less likely, 1730.

Table 1. Dendrochronological dating results for all samples taken from the Johannes van Ostrande/Johannes Radliff House, Albany, New York. For WANEY, +BE means the bark edge was present and thought to be recovered at the time of sampling; -BE means that the bark edge was not recovered or was completely missing on the timber. All correlations are Spearman rank correlations of each series against the mean of all of the others of the same species. If the outermost recovered +BE ring is completely formed, it is indicated as "comp", meaning that the tree was felled in the dormant season following that last year of growth.

ID	SPECIES	DESCRIPTION	WANEY	RINGS	DATING	CORREL
JRHANY01	Pine	6th cellar beam from north foundation wall	+BE	121	1608 1728 comp	0.30
JRHANY 02	Pine	5th cellar beam from north foundation wall	+BE	143	1586 1728 comp	0.33
JRHANY 03	Pine	4th cellar beam from north foundation wall	-BE	103	No Date	-.--
JRHANY 04	Pine	3rd cellar beam from north foundation wall	+BE	186	1542 1727	0.49
JRHANY 05	Oak	2nd cellar beam from north foundation wall	+BE	28	No Date	-.--
JRHANY 06	Pine	1st cellar beam from north foundation wall	+BE	139	1590 1728 comp	0.44
JRHANY 07	Pine	1st cellar beam (west end) from north foundation wall	-BE	133	1591 1723	0.59
JRHANY 08	Pine	Hearth support, northwest corner of cellar near stairwell	-BE	142	1583 1724	0.52
JRHANY 09	Pine	Northwest corner post, street level	+BE	41	No Date	-.--
JRHANY 10	Pine	North side wall, sill fragment on foundation (re-used morticed timber)	+BE	47	No Date	-.--
JRHANY 11	Pine	Jamless fireplace header, 1st floor, northwest corner of room	+BE	247	1482 1728 comp	0.51
JRHANY 12	Pine	West rafter, 4th pair from north wall	+BE	46	No Date	-.--
JRHANY 13	Pine	East rafter, 3rd pair from north wall	-BE	45	No Date	-.--
JRHANY 14	Pine	East rafter, 2nd pair from north wall	-BE	46	No Date	-.--

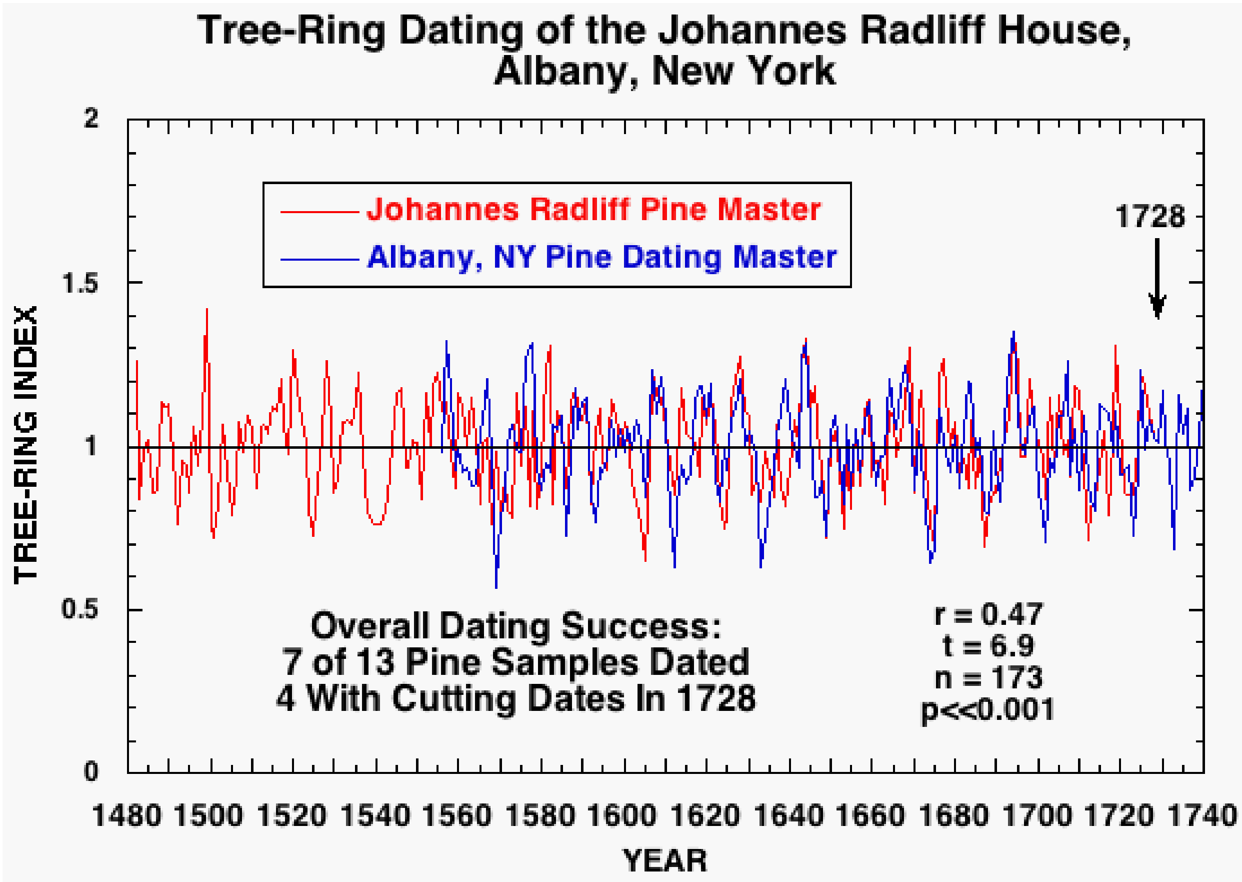

Figure 1. Comparison of the cross-dated pine master chronology for the Johannes van Ostrande/ Johannes Radliff House with a locally derived historical pine dating master from Hudson Valley/Albany NY. The Spearman rank correlation between the series (r=0.47) is highly significant (p<<0.001) with an overlap of 173 years and a t-statistic of 6.9. All 7 dated samples from the Radliff/Ostrande House are compiled in the site chronology.

The "r-factor" is the Spearman rank correlation coefficient, a measure of relative agreement between two groups of measurements or data. It can range from +1 (perfect direct agreement) to -1 (perfect opposite agreement). The "t-value" is Student's distribution test for determining the unique probability distribution for "r", i.e. the likelihood of its value occurring by chance alone. As a rule, a t=3.5 has a probability of about 1 in 1000, or 0.001, of being invalid. Higher "t" values indicate increasingly stronger statistical certitude.

The t-statistic (t=6.9) associated with the correlation between these two series (r=0..47) is highly significant (p<<0.001) for a 173-year overlap. For that reason, there can be no doubt that the dates presented here are very strongly valid, and that the statistical chance of the cross-dates being incorrect is much, much less than 1 in 1000.

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Edward Cook was born in Trenton, New Jersey, in 1948. He received his PhD. from the Tucson Tree-Ring Laboratory of the University of Arizona in 1985, and has worked as a dendrochronologist since 1973. Currently director of the Tree-Ring Laboratory at the Lamont-Doherty Earth Observatory of Columbia University, he has comprehensive expertise in designing and programming statistical systems for tree-ring studies, and is the author of many works dealing with the various scientific applications of the dendrochronological method.

William Callahan was born in West Chester, Pennsylvania, in 1952. After completing his military service he moved to Europe, receiving his MA from the University of Stockholm in 1979. He began working as a dendrochronologist in Sweden in 1980 at the Wood Anatomy Laboratory at the University of Lund, and returned to the United States in 1998. A former associate of Dr. Edward Cook at the Tree-Ring Laboratory of Lamont-Doherty, he has extensive experience in using dendrochronology in dating archaeological artifacts and historic sites and structures.

Some regional historical dendrochronological projects completed by the authors:

Abraham Hasbrouck House, New Paltz, NY
Carpenter's Hall, Philadelphia, PA
Christ's Church, Philadelphia, PA
Conklin House, Huntington, NY
Customs House, Boston, MA
Daniel Pieter Winne House, Bethlehem, NY
Pieter Winne House, Bethlehem, NY
Ephrata Cloisters, Lancaster County, PA
Fawcett House, Alexandria, VA
Gadsby's Tavern, Alexandria, VA
Gilmore Cabin, Montpelier, Montpelier Station, VA
Gracie Mansion (Mayor's Residence), New York, NY
Hanover Tavern, Hanover Courthouse, VA
Harriton House, Bryn Mawr, PA
Hollingsworth House, Elk Landing, MD
Independence Hall, Philadelphia, PA
John Browne House, Forest Hills, NY
Log Cabin, Fort Loudon, PA
Lower Swedish Log Cabin, Delaware County, PA
Morris Jumel House, Jamaica, NY
Old Swede's Church, Philadelphia, PA
Panel Paintings, National Gallery, Washington, DC
Pennock House & Barn, London Grove, PA
Powell House, Philadelphia, PA
Spangler Hall, Bentonville, VA
St. Peter's Church, Philadelphia, PA
Strawbridge Shrine, Westminster, MD
Thomas & John Marshall House, Markham, VA
Varnum's HQ, Valley Forge, PA
William Garrett House, Sugartown, PA
Yew Hill, Fauquier County, Virginia