Dendrochronological Analysis of Historical Structures In southwestern Ohio Dewitt House Oxford, Ohio.

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Initial Dendrochronological Analysis of 
Historical Structures 
In southwestern Ohio 
Dewitt House 
Oxford, Ohio 

Report submitted to the Historical Society 
July, 2008 
Sampled: July 17th 2008 

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Objective: 
To provide a calendar date for the felling of timber from the Dewitt House using 
dendrochronology and to develop a ring-width chronology from the timber used in the 
construction of the structure. The ring-width data will be added to the northeastern Ohio 
database, thus expanding the databank farther into southwestern Ohio. Data will 
contribute to the understanding of past climate variability over the past six centuries. All 
logs are archived at the Wooster Tree Ring Lab, housed in the Department of Geology, 
The College of Wooster. 

Methods and Analyses: 
Eight series were measured from cores from the structure (Table 1). The samples were 
prepared and sanded, annual rings were counted, measured to the nearest 0.001 mm, and 
then crossdated using standard dendrochronological techniques (Stokes and Smiley, 
1968) (Fig. 1). Multiple series are measured from a site to determine annual ring 
correlation along differing cross sectional radii. All series from a site are then crossdated 
against each other, developing a “floating” site chronology before crossdating with the 
calendar dated northeastern Ohio regional series. Crossdating is strong with a regional
master chronology from NE Ohio as well as with the more local southwestern Glen Helen chronology (ITRDB).

Series were successfully correlated but only three of the eight series were oak. The other samples were white ash and did not prove useful in finding calendar dates. None of the oaks provided true outer rings (cut dates), important in dating the year of felling (Fig. 2). Before coring, wood was marked with a red sharpie to indicate whether the collected sample provided an outer ring. The best way to know if an outer ring is present is if there is remaining bark. However, bark often holds moisture allowing the outermost rings to rot. Because of this, we cored in areas without bark but just below where bark would be. The series from this structure do not have a true outer ring, but are within a few decades of the oak outer ring calendar dates. Visual examination for samples without a true outer ring suggest that the true outer ring was extremely close to the documented last year of measurement. The outermost rings also provides the season of felling for the logs. The wood was normally cut both in winter and during the oak growing season. In winter, the tree had stopped growing for the year, providing a completed outer ring. When a tree was cut prior to winter, within a tree’s growing season, the ring was found to be incomplete; cut before the formation of the latewood.

For an example, Figure 2 indicates the end of annual growth for the year with a dark line forming along the transition from the sapwood to the bark.

The sites together create a 118-year chronology spanning 1677 – 1794. The data from the structure are instrumental in expanding our strong northeastern regional chronology into the surrounding regions of Ohio. The positive outcome of these series suggest further inquiry into the southwest as a potential location for chronology extension.

**Graphs:**

Individual ring-width data from the southwestern Ohio series were developed into a master chronology (Figs. 3 & 4). Location in forest and the health of surrounding trees influence the growth of an individual tree and the width of a ring. Detrending by “smoothing” removes the influence of growth function from a ring’s width.

We are pleased to note that both raw-width data and detrended data have similar features and share a number of narrow ring calendar dates. In both, 1699 and 1816 are
two of the narrowest rings for years with a significant number of series (late 1600s - 1850). 1816 is a recognized internationally as the “Year without a Summer” following the 1815 Tambora eruption (Rampino et al., 1988). 1699 is the narrowest ring found in northeastern Ohio and correlates with a large-scale volcanic event (D’Arrigo, 1999). Both NE and SW Ohio have a narrow 1839 ring.

Table 1: The Dewitt House

<table>
<thead>
<tr>
<th>Sample</th>
<th>Inner Ring</th>
<th>Outer Ring</th>
<th>Number of Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH04</td>
<td>1690</td>
<td>1791</td>
<td>102</td>
</tr>
<tr>
<td>DH05</td>
<td>1677</td>
<td>1794</td>
<td>118</td>
</tr>
<tr>
<td>DH06</td>
<td>1716</td>
<td>1789</td>
<td>74</td>
</tr>
</tbody>
</table>

Figure 1: Dendrochronological principle of crossdating used for all site studies. Crossdating allows the crossover and linking of rings from many cores that span similar years, creating a continuous annual record covering more years than a single core could provide.
Figure 2: Outer ring, bark boundary from Bellbrook’s BB3B. The final annual ring of growth for the tree was in the winter of 1850 – 1851 as the ring is complete with earlywood and latewood, representing an entire season of growth.
Figure 5: Graph of Southwest Ohio annual raw ring-width data with time. Large juvenile width is noted in the initial decades of growth which then quickly narrow. After narrow rings 1699, 1816, and 1839 there is a ramping up of width in succeeding years.

Figure 6: Smoothed, or detrended graph of Southwest Ohio annual ring-width data. The black box represents a period of narrow growth, which continues on for the next one hundred year period. Ring width starts to increase around the time of settlement in the area.
Reference:


