The dendrochronological date of a corduroy road, Tuxedo Reserve, Orange County, New York

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A line of corduroy logs was uncovered in the Tuxedo Reserve site in Tuxedo, Orange County, NY, and its history is currently under investigation, with potential for future preservation as a historical landmark. Questions arose as to when this road was constructed - whether the logs had been lain down as long ago as the colonial period around the time of the American Revolution, for a bridal path in the late 19th century, or as recently as in the last decade. In an attempt to determine its historic context, two sections of one log from the road, plus two sections of live ash trees expressly felled for the purpose of dating the road, were sent for dendrochronological analysis to the Cornell Tree-Ring Laboratory by Faline Schneiderman-Fox of Historical Perspective, Inc., Westport, Connecticut. The sections of log are complete cross-sections from a small tree, pith to bark, with a maximum diameter of 16.1cm. The species is black ash, *Fraxinus nigra*. The samples represent one tree, and their measurements contain the “common signal,” contained in black ash trees around that site. The two live trees contain very different patterns to each other; the sample diameters are 27 and 47 cm. The large tree grew outside the swampy area, and the smaller within the swamp. They are both white ash, *Fraxinus americana.* The felling of these trees was crucial to determine if this section of road was constructed recently or could be part of an earlier road; we had no securely-dated ash chronology of either species with which to compare the historic log’s ring-width sequence. The live tree samples plus the report from Schneiderman-Fox that “The site is seasonally inundated, and dries out in the late summer months; at least half the logs are most definitely exposed to air for at least part of the year,” indicate that a recent construction date was most likely.

Upon arrival at the lab, the surface of each historic sample was prepared with a razor, the live samples were sanded, and the rings examined and measured under a stereomicroscope, with the sample on a moving table. The ring counts are 75 and 80 for the historic samples 1 and 2, respectively; sample 2 was cut from closer to the base of the tree, and thus has an earlier pith date (Figure 1). The two data sets were averaged together, and the average widths were detrended by fitting a curve to the whole sequence and using the curve’s values as the normal width for each corresponding year. For the live trees, the ring counts are 93 and 86 for samples M1 and M2, and their relative ring size is shown in Figure 2, where it is obvious that the one on higher ground struggled, probably competing with other bushes or trees for light, during its first 35 years of growth, then it became dominant and its rings were quite wide for the rest of its lifespan. The M2 sample grew similarly over its whole lifespan, yet with wider rings than the historic tree. The 2010 rings in the live trees were incomplete, containing a few earlywood vessels, and were not measured.

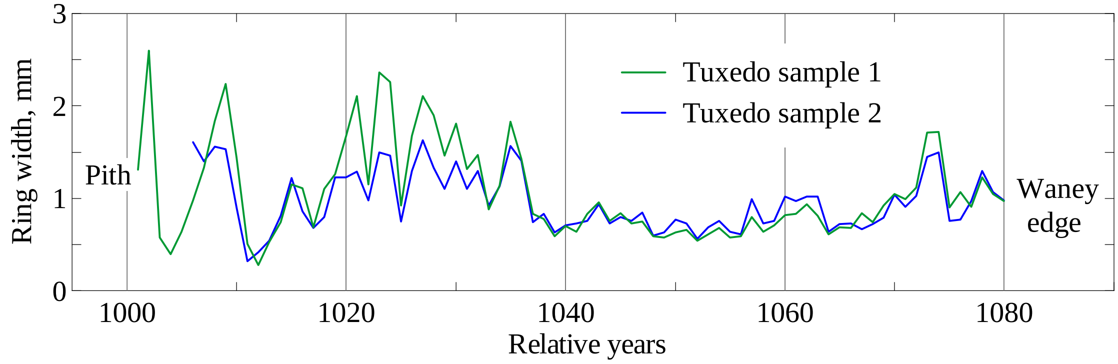

Figure 1. Ring-widths of the two historic road samples (from the same tree) are shown here. The sample 1 section came from closer to the ground than sample 2, it contains a few earlier rings. Both samples end with a complete ring at the "Waney edge" (the ring just below the bark). The within-tree similarity is quite remarkable.

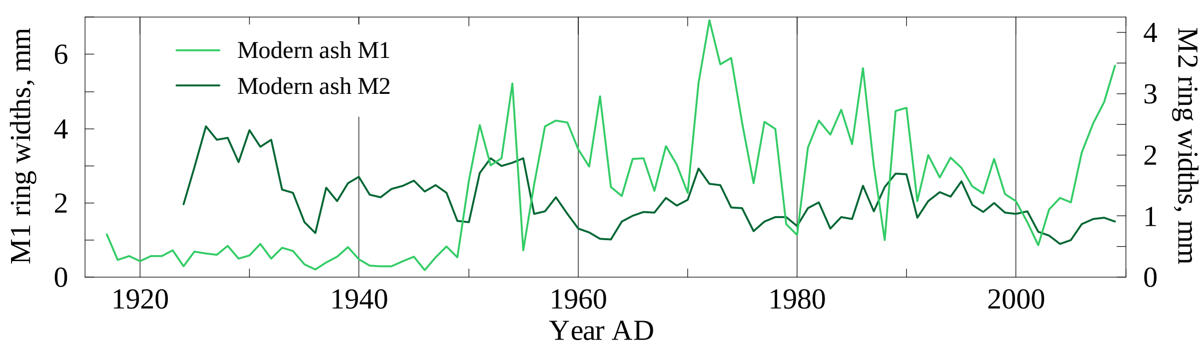

Figure 2. Ring widths of the two modern tree samples are shown here, with their outer complete rings at 2009, bark and felling date at 2010. Of note are the differences in the rings widths – M1 is the tree on higher ground, M2 is the one from the swampy area. Also of note are the similarity of the lifespan in these and the historic tree.

To obtain secure calendar dates for any tree-ring sequence, its patterns of wide and narrow rings are compared to patterns in the tree-ring sequences and chronologies built from measurements of other samples of the same genus, and species if possible, over time. Visual inspection and statistical tests determine the similarity of the patterns; a secure crossdate determines a sequence's placement in time. Each of the modern tree sequences from Tuxedo Reserve was detrended with a floating average; the two sequences were then averaged together. The average of the two historic log sequences was likewise detrended, and the two sets of data were compared both visually and statistically to see if there were any similarities between the two sequences even if they represent different species. Figure 3 shows the results of a good visual match with significant correlation; there is similar variability in the ring growth of both sequences in the first 40 years of overlap (up to 1965), then there is slightly less similarity in the last 40 years. This is a secure placement, and it puts the outer ring of the corduroy road log, thus its felling year, at 2004. This corduroy road was constructed very recently, and was not part of a colonial or late 19th century construction.

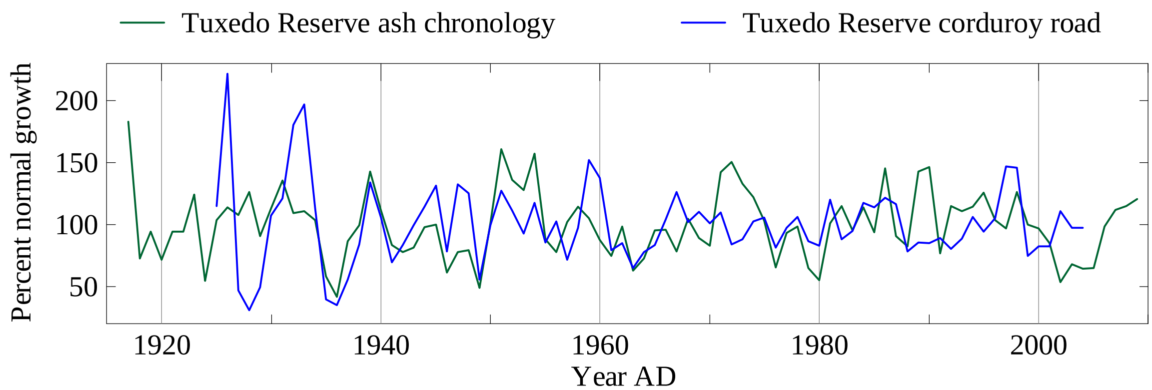

Figure 3. The detrended sequence of the Tuxedo Corduroy Road sample is shown here where it matches with the Tuxedo modern ash chronology. The results of the statistical tests are: Student's *t*-score of 3.84 and correlation coefficient of 0.40, both significant at the 95% level with 80 years overlap.

The early years' similarity and later years' differences, could be merely be the results of the idiosyncrasies of the one tree sample from the corduroy road. They could also be the result of a similar response of both species during the juvenile growth years, then upon maturation (after 30 to 40 years), the black and white ash responded slightly differently to ecological and climatic parameters. Both ashes are common to northeastern North America; however the black ash generally grows in poor, swampy soils, and the white ash in well-drained, sandy landscapes. Thus the differences may be the result of the root systems of the respective trees being in the swamp, with standing water, versus the higher ground with better drainage. A wet growing season would help the ash on high ground grow wide rings, while perhaps hindering growth in the ash in the swamp due to a higher water level in poorly drained soils.

With the date of 2004 for the construction of this corduroy road, I trust that final decisions can be made as to its fate.