TREE-RING ANALYSIS OF A SECTION OF YEW FROM THE CHURCHYARD OF ST. MARY’S, WEST HORSLEY, SURREY.

by A K Moir (Tree-Ring Services)

Britain’s ancient trees are as much part of our heritage as its venerable buildings which they often pre-date, but much less is known about them. The English yew (*Taxus baccata* L.) is one of our few native conifers and is probably our longest lived tree. Many specimens are thought to be well over 1,000 years old, but because the largest specimens are generally hollow, the empirical evidence is scant. The churchyards of England and Wales contain many large specimens, the largest recorded trunk girth is 17m (56ft). A yew tree at St. Mary’s Church, West Horsley was recently felled due to it causing cracks in the masonry at the northwest corner of the church’s foundations. A section of this yew, which was located a couple of metres west of the north porch (NGR: TQ 0883 5269) was saved and submitted for tree-ring analysis. A water colour picture painted in AD 1823, shows the earlier relationship of the tree to the church and indicates that the path to the church changed position. The north aisle was doubled in width in c. AD 1850, the north west buttress was built right up to the yew (A. D. Grace pers comm.).

Currently, the only precise way to determine the age of a living tree is to count the annual rings from a section or core which intersects the pith of the tree. The use of a narrow (5.14mm) diameter corer enables samples from living trees to be taken with almost no damage. However, when available, complete cross-sections are particularly useful to recover pith and to avoid possible problems where rings become extremely narrow. In this instance analysis of the complete section

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proved impractical due its size and weight and therefore two V-sections of wood were cut out. The rings on these V-sections were then revealed by the use of a belt sander, working with progressively finer grits. The rings were then measured under a x20 stereo microscope to an accuracy of 0.01mm using a microcomputer based travelling stage.

Tree-ring sequences revealed through the sanding of part of the V-section WHCX01a cut from the full section of yew.

The centre of the section showed no evidence of rot. The rings measured from the two V-sections resulted in a 312-year sequence. This sequence could be matched against other previously established oak and yew ring sequences, which confirmed its annual resolution and dated it as spanning the years AD 1691 to AD 2002. The steep angle of the sides of the yew section indicated that it had been cut from the base of the tree, and therefore the ring measured at the pith probably represents the first year that the tree was growing. The tree was identified to be 313 years old when felled. No information was provided on when the tree had been felled, but as the bark occurs just after the initial development of the outer ring in AD 2003, the tree is shown to have been felled in the spring or summer of AD 2003.

Plot of the ring sequence established from the yew tree

The relationship of a yew standing just opposite or adjacent to the porch (in this instance porches) is common and implies that the yew was planted rather than naturally self sown. The mean rate of growth for the first 26 years was lower than expected, and the narrowest ring of the sequence occurs in AD 1705. Although yew is known to naturally establish itself from seed in the area, it is considered likely that the tree was planted in AD 1705. At this time the trunk (discounting bark) would have been about 12mm in diameter. Tree-ring analysis of the yew trees at Hampton Court Palace has helped confirm that the Privy
Garden there was planted c. AD1700 to AD 1703. The close coincidence of these dates suggests a fashion for the planting of yew during a period of Protestant succession to the throne, in the reigns of William & Mary (AD 1686 to AD 1702) and Queen Anne (AD 1703 to AD 1714).

It had been expected that the laying of foundations and subsequent building of the north west buttress in such close proximity to the yew tree in c. AD 1850 would have affected the growth of the tree, but no evidence of this was identified in the tree-ring sequence. The tree had an average growth rate of 2.816mm/yr. during its first 99 years of growth while the tree developed a full crown. Once maturity was reached (around AD 1790) the tree had an average growth rate of 0.886mm/yr. over the next 213 years of growth.

Yew tree age estimation remains largely based on tentative average projections from painstakingly gathered girth measurements. The age of churchyard yews is usually estimated by an equation produced by Paul Tabbush and John White, which states: Tree age = Girth in centimetres² / 310. Applied to the St Mary yew, which had a girth of 2.8m, this results in an estimate of 253 years old, which underestimates its actual age by 19%. Individual yew trees are evidently variable in their growth, and such a margin of error extrapolated to churchyard yews which can often be over 6m in girth clearly demonstrates the possibility for inaccuracies. The girth of our very largest trees, and hence the trees of greatest interest, often makes it impossible to sample their piths, (as already mentioned, the largest yews are anyway generally hollow). Nevertheless, tree-ring analysis of samples from such trees, which facilitates a more accurate estimation of the "missing" section to the pith, currently offers the most accurate empiric refinement for the age estimation of large trees.

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The full report should be referred to, and referenced in quoting this article: A. K. Moir, "Dendrochronological analysis of a Churchyard yew tree from West Horsley, Surrey, England", Tree-Ring Services Report WHCX/33/04. This report may be downloaded as an example report called “Live trees” from the front page of the web-site at: www.tree-ring.co.uk. Reports on other larger girth churchyard yew trees, many also be ordered through this web-site.