The Beech at St Peters Rectory Heysham.

(felled December 2007)

As trees get bigger, adding a new layer of wood on the outside of the trunk every year, they lock in secrets about their past and about the environment in which they grew.

Tree rings – the pattern of annual growth rings that produce the characteristic appearance of wood from temperate regions – can tell us much about the history of individual trees and this is not just limited to telling us the age of the tree. Periods of interrupted or abnormal growth may show when roots were cut or the ground around the tree was covered in tarmac. Narrow rings may show some abnormal local climate event. For example - in the South West of England most trees produced an abnormally small annual growth ring in 1963 when the snow lay on the ground until June. Patterns of sudden increased growth may show when neighbouring trees fell or were removed and our tree enjoyed a sudden increase in sunlight.

The Arboricultural Advisory and Information Service (part of the Tree Advice Trust) is a national organisation that undertakes research and publishes information on trees. The AAIS is currently investigating what tree rings can show about the history of individual trees and also the development of decay in old trees. When it became known that an old Beech tree outside Heysham Rectory was to be felled the AAIS asked for a section of the trunk to see what story it could tell.

With the Rector's permission a 200mm thick disc (a transverse section) was cut from the trunk of the tree between 1.5m and 2m above ground. The disc was taken to the AAIS laboratory in Farnham for investigation.

With a consistent pattern of annual rings throughout the disc we can be fairly confident that the earliest ring on the disc, the central ring, was laid down as a new vertical shoot in 1810. As this shoot would have been formed when the tree had already grown to between 1.5 and 2m above ground we can guess that the tree may have been 4 to 10 years old when it laid down this shoot, giving a total age from germination of about 204 years.

Is 204 years old for a beech tree? Compared to the oldest living tree on the earth, a Bristlecone pine, which is nearly 4,800 years old this is a very modest age. In Britain the oldest known individual trees are oaks that are approximately 1000 years. (The oldest clonal groups that have regenerated as suckers or trunk shell fragments are much older – the Fortingall yew and Silk Wood lime are estimated to be between 2000 and 6000 years old). By contrast, birch and willow trees rarely get to be 100 years old and their typical life expectancy can be as little as 50 years.

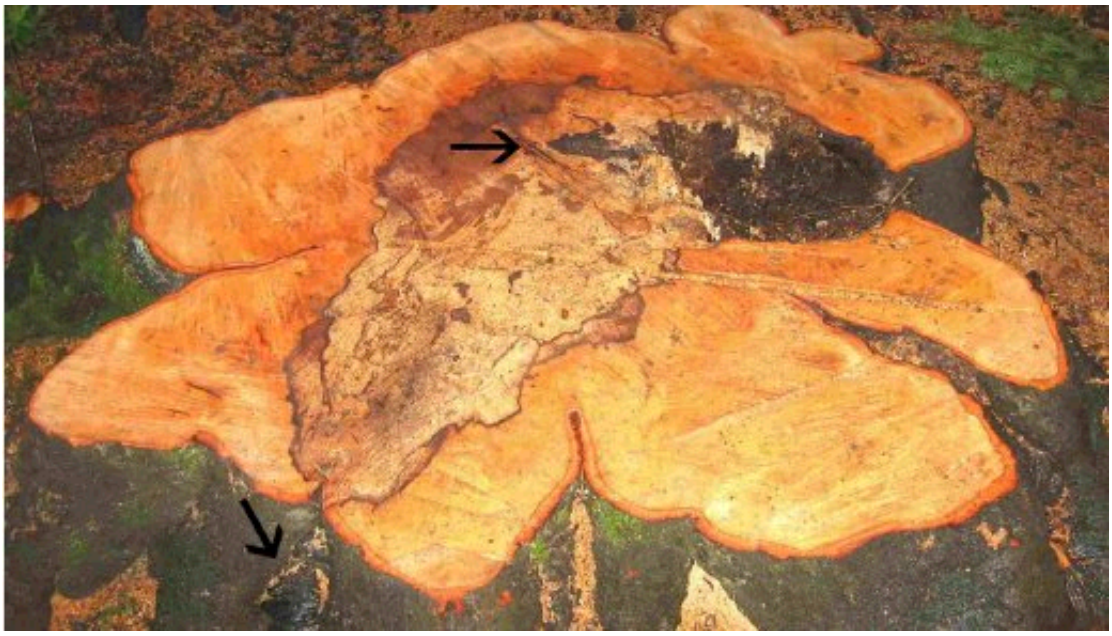
The longest lived individual "maiden" (unpruned) beech trees in Europe are thought to be between 300 and 400 years old but some of the ancient beech pollards in Burnham Beeches are suggested as possibly up to 500 years old. The vast majority of Beech trees in Britain however will not expect to live to over 150 years and the Heysham beech tree and those similar trees that still remain nearby are certainly very old for their species.

For those interested in estimating tree age from trunk measurements the disc had a circumference of 2.74m or 108 inches. The simple 1inch circumference for each year of growth put forward by Alan Mitchell (Field Guide to the Trees of Britain and Northern Europe) clearly does not work for this tree. It is usually a fairly accurate system, but trees growing in places where root development is limited or those growing on shallow soils can be expected to have significantly smaller trunk circumferences than similar aged trees grown in the open or in fertile soils.

The disc shows wider growth rings for the first 50 years (average 3.6mm per year) then steady growth with consistent annual radial increments until it was about 110 years old (average 1.7mm per year). After this the growth slowed but was consistent in the last 90 years of its life (average 1mm per year). The last annual ring (laid down in summer of 2007) was not significantly different to any of the previous 60 rings. This is a typical long-term growth pattern in most trees and the Heysham beech may have continued to grow for many more years in this way.

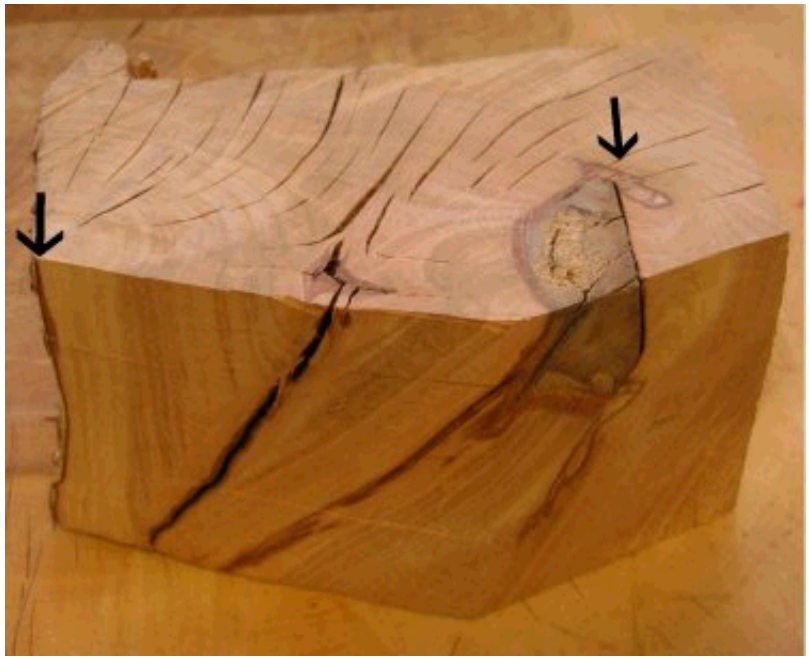
The tree showed a distinct period of narrow rings between 1910 and 1915 and another in the early 1940s. It is most likely that these periods of abnormally slow growth are related to changes around the tree, possibly to root severance from excavations or to new surfaces or resurfacing of the adjacent driveway. Extensive crown pruning could also have led to reduced growth but this seems an unlikely explanation as there is little evidence of pruning in the crowns of the two sister trees. If other trees in the wider local area were to show similar periods of reduced growth at the same times it could be shown to be localised climatic factors at work.

The pith of the disc is not in the centre, but offset significantly to the north as shown in the stump photo below. This is not abnormal and suggests that the crown of the young tree was more heavily weighted to the south as would be expected given competition for light from the sister trees to the north.



Stump – the top arrow marks the pith. The bottom arrow marks a fungal fruit body.

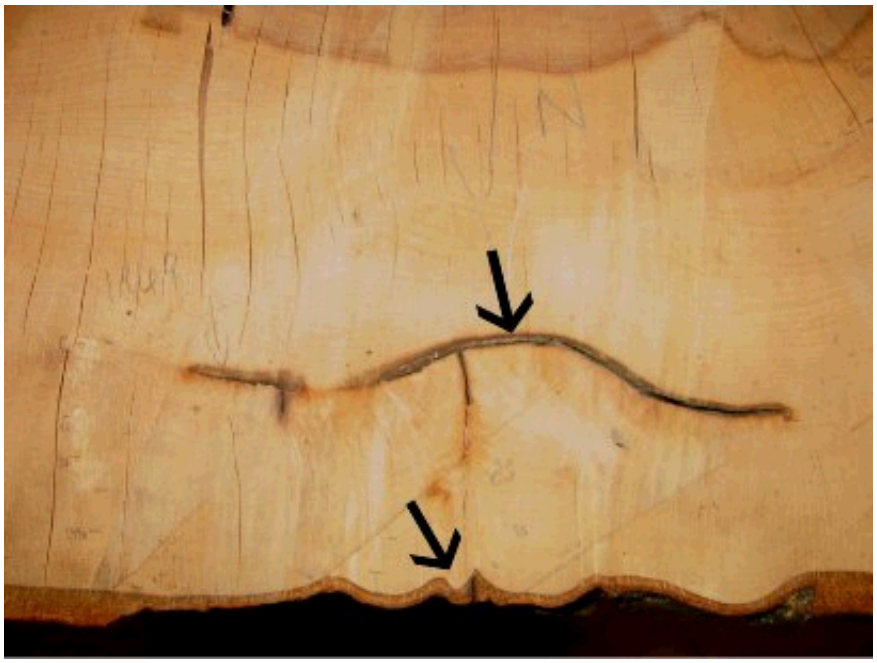
When young, the tree grew a large side branch from the trunk on the west side at approximately 1.5m above ground. This branch had a narrow angle to the trunk. This type of branch formation can lead to weak forks in later years and was presumably recognised as an undesirable structure as it was cleanly pruned off in the winter of 1832/33. The cut face of the wound was neat and was most likely to have been formed by a saw as compared to an axe or bladed tool. There was minimal decay resulting from the wound despite it taking 12 years to close over with new wood from the edges. See photos below.



Block cut out showing 1832/33 pruning cut. Left arrow shows the centre of the trunk, right arrow the pruning cut.

Transverse section through trunk showing 1832/33 pruning cut. Left arrow shows the centre of the trunk, right arrow the pruning cut.

In the winter of 1949/1950 the trunk of the tree was wounded on the north side where a large area of bark had become detached from the tree. The wound took 26 years to close over and the outer bark of the tree when it was felled still showed the scar as thinner bark with a central ridge. There is no evidence that it was caused by animals, insects, fungi or fire and it appears most likely that the damage was caused by man or machinery abrading the trunk. Similar to the branch wound of 1832, there was remarkably little decay associated with the wound. See photo below



Bark wound of 1949/1950 marked by top arrow. Thin bark and ridge still visible on trunk when tree felled - marked by bottom arrow.

The tree was felled because some of its bole was decayed by fungal activity. The fungus was identified in the laboratory as *Ganoderma adspersum*. A fruit body can be seen in the photograph of the stump. The decay in the cut stump had caused a cavity that ran through from the west side to the southeast side. In the disc sample 1.5m – 2m above the stump there was only partial decay and discolouration of the wood in the central part of the disc.

The pattern of decay is typical of that caused by *Ganoderma* sp. which causes a slow heartwood rot in the lower trunks of trees of many species. The fungus is commonly associated with mature beech trees.

Had the tree grown in a position away from people and property it may have survived for possibly 50 or 100 more years before finally succumbing to the inevitable fate of all trees. However, fears for safety and, perhaps even more so the fear of litigation in the event of an accident, often lead to trees being felled prematurely.

It is not possible to accurately predict whether the Heysham beech tree would have collapsed in the near future had it been left standing, but the extent of the cavity in the stump, which formed a break from one side to the other, would have significantly reduced the strength of the lower trunk in relation to horizontal turning forces. It would have needed a confident, experienced arboriculturist to advise that the risk posed by the tree was not sufficient to justify felling.

There is a rising debate in the world of professional arboriculturists as to the real (as compared to perceived) risk posed by trees to people and the recent published report by the Health and Safety Executive – "Management of the risk from falling trees" http://www.hse.gov.uk/lau/lacs/23-22.htm identifies some interesting facts that may help tree professionals to reach sound and balanced decisions.

The report states: *"Each year between 5 and 6 people in the UK are killed when trees fall on them. Thus the risk of being struck and killed by a tree falling is extremely low. Around 3 people are killed each year by trees in public spaces; but as almost the entire population of the UK is exposed, the risk per person is about one in 20 million."*

Compared to other risks encountered in everyday life the risk posed by trees, even those colonised by fungi is very low but that does not mean that we don't have to manage trees in public places. We just need to make sure the actual level of risk is balanced against the benefit provided by trees.

Ben Holding
AAIS
March 2008
www.Treehelp.info