5 THINGS YOU CAN LEARN FROM TREE RINGS

The science of tree-ring analysis is called **dendrochronology**. Examining the rings in tree cross-sections from **cookies** or sample **cores** (which are used more often) can tell you a lot about a tree, its history and the environmental conditions it grew under. Like this 218-year-old black spruce tree from northeast of Havre-Saint-Pierre, Quebec, which began life as a seedling in the boreal forest in the late 1700s.

1. Tree age

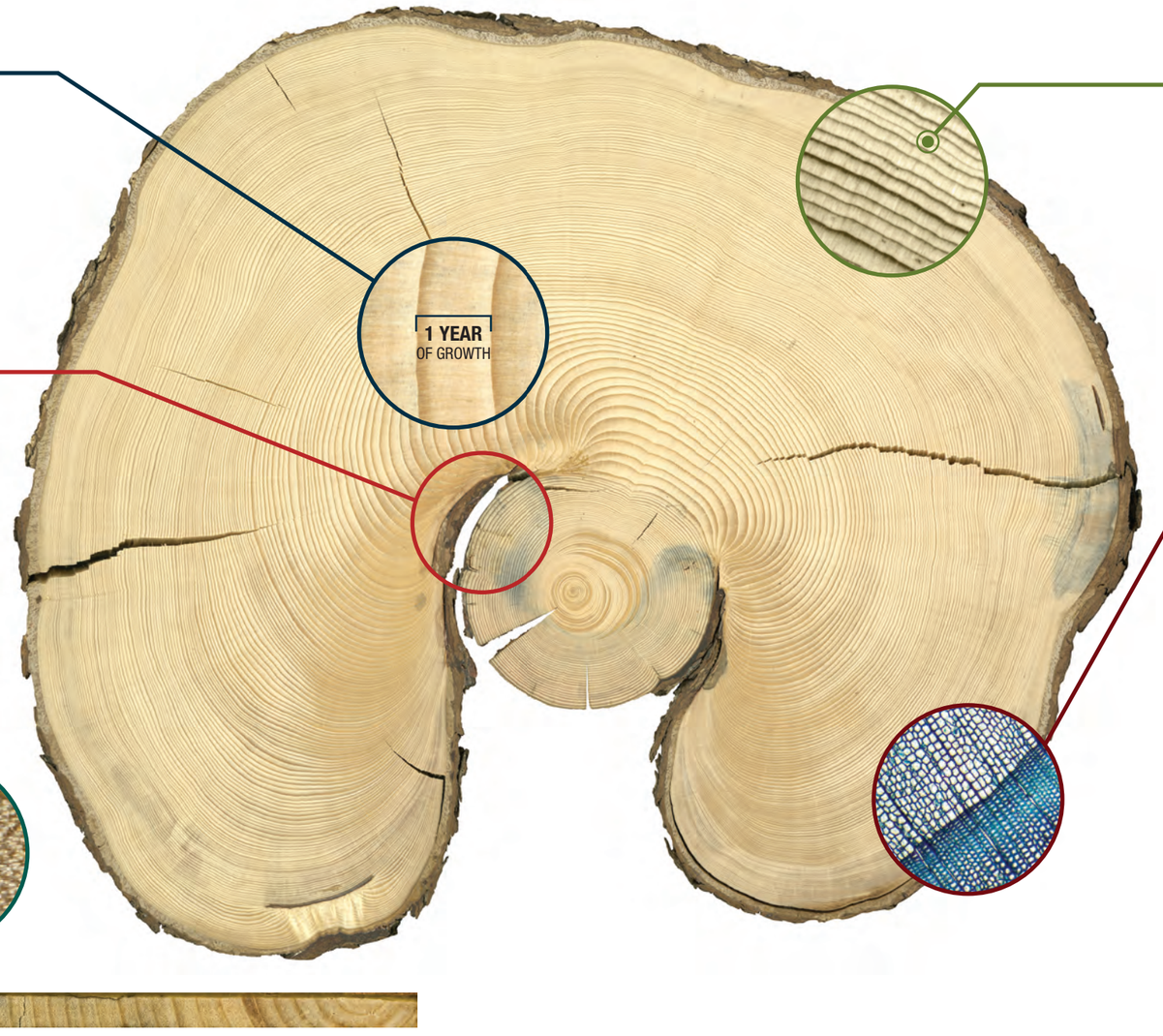
As trees grow, they form rings made up of a band of light wood produced in the spring (earlywood) and a band of dark wood that forms later in the summer (latewood). This means the wood produced in one year can be measured by the width of one ring of light and dark wood. Counting the number of rings from the outer bark to the centre of the tree – or pith – tells you how old a tree is and is useful for dating historical events in the life of the tree and its surroundings.

2. Fire history

Fire scars occur where a portion of the growing part of the trunk, known as the cambium, is damaged by fire and the tree attempts to cover the wound with new growth. Some fire scars completely heal over, but others remain open (unhealed) due to repeated fires or significant decay of the burned wood – like this one dating back to a fire in 1868, one year after Confederation.

3. Insect outbreaks

Severe or repeated defoliation – the stripping of a tree's leaves or needles – by insects such as the forest tent caterpillar is stressful to the tree and causes a marked slowing of growth that can be seen in the pale annual growth ring on this trembling aspen core. This "white ring" is also of lower density than the wood the tree produced before defoliation and after recovery. Studying the occurrence of white rings in many trees helps scientists better understand the impacts of tent caterpillar outbreaks on aspen forest productivity, how insect populations change over time and how ecosystems respond to outbreaks.



Trees are rarely cut down for tree ring analysis. Instead, a borer is used to extract a core sample of wood, about 3 to 10 millimetres in diameter, extending from the bark to the centre of the tree. This trembling aspen from north of Fort McKay, Alberta, was about 60 years old when sampled in 2006.

4. Climate conditions

Trees with the right amount of sunlight, rainfall and ideal temperatures grow faster and produce wider growth rings than trees under stress. Drought, disease, temperatures that are too hot or too cold and shading or crowding by other trees can slow down tree growth, leaving narrow rings. Studying rings from many trees across the landscape can help scientists understand how the climate may be changing and affecting forest ecosystems over time. The same narrow ring in this tree can be seen in hundreds of other tree samples, suggesting dry soil conditions in the late summer of 1984 across parts of Canada's eastern boreal forest.

5. Wood fibre quality

Wood characteristics like density, sound absorption, strength and stiffness are important qualities that determine the suitability of wood for specific products or end uses, from guitars to engineered wood products and pulp used in packaging and textiles. Microscopic views of tree rings – like this one magnified to 57 times its normal size – can show irregularities in cells caused by water stress or bending due to wind or snow. These irregularities can make wood inflexible, weak or resistant to surface treatment and potentially limit its use for some products. The ability to identify wood fibre qualities of trees before harvest allows forest managers to make better business decisions about what products can be made from the trees growing in a specific forest, and what trees are best suited to plant for future forest products.

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