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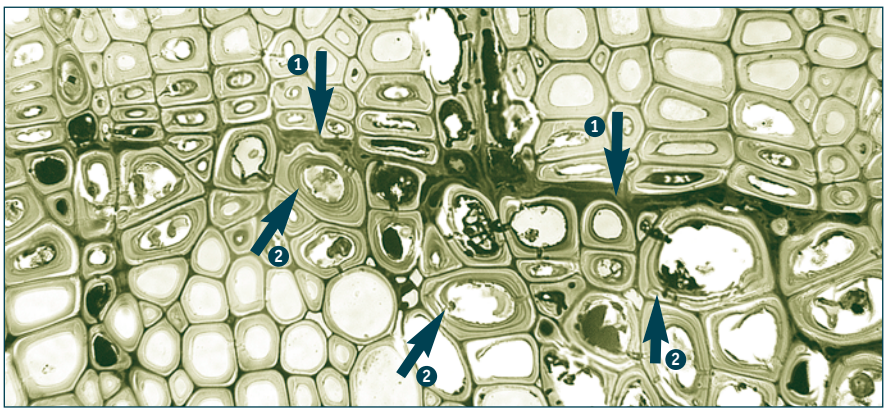
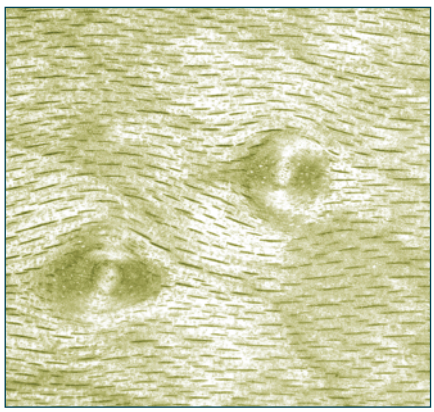
Birdseye maple: a matter of hormones?

Birdseye maple, an extremely rare wood, has a distinctive pattern of small spots resembling birdeyes, hence the name. Birdseye maple is not a species of maple, but rather a phenomenon that occurs in some trees for reasons that are still not understood.

A number of theories have been advanced to explain the origin of these markings in the wood, including infection by a pathogen, heredity, difficult growing conditions, climatic stress or attacks by woodpeckers. However, no studies have been able to establish that any of these factors, or a combination of them, are actually responsible for the birdseye pattern. Researchers from the Canadian Forest Service, in collaboration with CERFO[1], have therefore focused their attention on the fine anatomy of birdseye maple in comparison to normal maple. The anatomical characteristics of birdseye wood might provide some clues to help solve this mystery.



Beginning of the growth ring: collapsed cells (arrows 1) adjacent to hypertrophied cells (arrows 2). The cambium is at the bottom.
Photo: D. Rioux



Grain pattern of birdseye maple.
Photo: D. Rioux

Light and electron microscopy observations have revealed some unusual features in birdseye maple. In the spots of birdseye maple, the vessels of the wood are shorter and smaller in diameter than those found in normal wood. Also, there are unusual thickenings of vessel secondary walls, and gaps have been observed between cells. Birdseye wood is also less lignified than normal wood. Finally, collapsed cells followed by hypertrophied cells with lignified walls are observed at the beginning of wood growth rings. In the corresponding bark, a thin strip of living phloem (the tissue that transports sap) and numerous collapsed cells are visible. These features suggest that pressure exerted by the bark causes or contributes to the formation of birdseye wood.

1 CERFO : Centre d'enseignement et de recherche en foresterie de Sainte-Foy inc.

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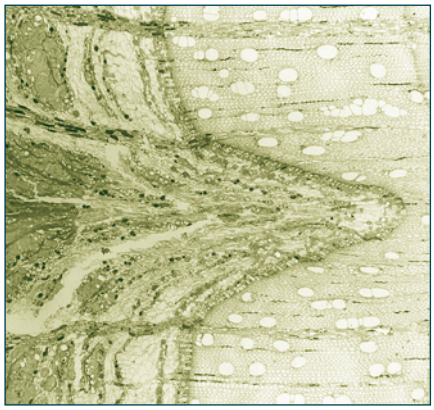
However, what causes this pressure if it cannot be accounted for by any of the most plausible theories?



Birdseye anatomy.
Photo: D. Rioux

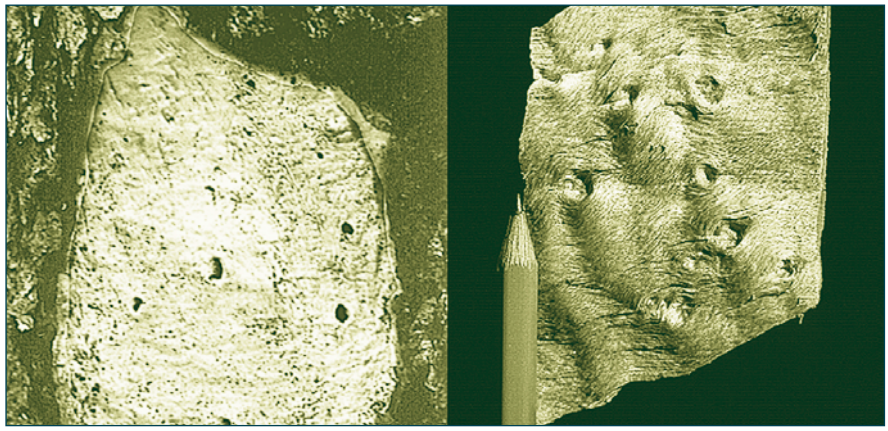
Environmental stresses can affect the formation of vessels by modifying water absorption and the availability of carbohydrates and other nutrients. However, high levels of ethylene can also stimulate phellogen (the tissue that creates the outer bark) activity and generate pressure directed toward the vascular cambium (the tissue that creates the wood and the inner bark). It has frequently been reported in the scientific literature that ethylene is involved in the occurrence of certain specific anatomical features also observed in birdseye wood. This hormone could therefore be the key factor in the formation of birdseye wood.

Ethylene, a plant hormone

Ethylene, a gas first identified as a petroleum by-product, was found to act as a plant hormone in 1901. At the time, it was observed that the leaves of plants located near gas street lamps dropped prematurely. This hormone modulates many metabolic activities, including flowering, fruit maturation and leaf fall.

A highly prized wood!

Because birdseye maple wood is rare, it commands a very high price. This uniquely patterned wood is sought after by veneer industry and for fine woodwork applications: production of unique furniture, guitar necks, and dashboards of automobiles such as Rolls Royces. In Quebec, the price of peeler quality wood ranges from $4,000 to $20,000/1,000 bd ft. Top quality peeler logs have no curvature, little heartwood and birdseye spots that are well distributed around the trunk.



Indentations in the bark (left) and in the wood (right).
Photo: CERFO

Birdseye maples account for at most 5% of harvestable trees in maple stands. Even when this proportion is only 1%, it can sometimes represent a substantial source of additional income for woodlot owners. Until such time as researchers are able to determine how to induce the formation of the birdseye pattern in trees, it is worthwhile to identify the best birdseye maple specimens in a maple stand. The Field guide to identifying birdseye maple, published by CERFO, is a valuable identification tool.

USEFUL LINK:

CERFO
http://www.cerfo.qc.ca/

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