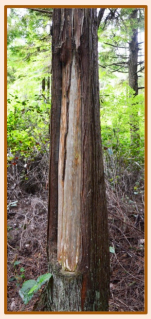
THE SCIENCE OF CEDAR

Western redcedar (*Thuja plicata*) was by far the most important material used by coastal First Peoples of British Columbia. They used it in all aspects of their lives from diapering their children, cooking food, transportation, house building, monument construction, hunting and fishing, and placing the dead. Working with cedar wood was traditionally done by men while working with bark was done by women. These traditions have changed over time as we see more women carvers and men weavers. What is it about cedar that makes it such good material for so many things? In this presentation we will explore the biology behind some of the uses.

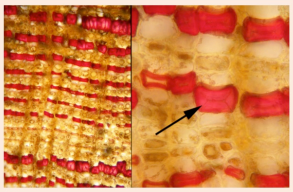
BARK: Bark of *Thuja plicata* is fibrous and used to make a number of items. The outer bark is coarse and rough, and the inner bark is soft as the tissues are not fully lignified and suberized (lignin is the material that makes wood and bark tough, suberin is a wax-like substance). Bark was used in roofing and siding, but it is the inner bark that is processed to make ideal material for making baskets, mats, clothing, diapers, rope, adornments for ceremonial objects, and so much more!

Bark is the protective outer layer of the tree, but also includes food conducting tissue (phloem). The innermost layer of the bark is the vascular cambium. These cells divide to produce wood tissue to the inside of the tree (xylem) and phloem tissue toward the outside. Spring is the traditional time to harvest bark. This is when the vascular cambium is actively dividing and thick; the "sap is running" and the bark is easy to peel off. Sap (contents of the phloem, including sugars and nutrients) should not be confused with resin.

Tall, straight trees, with few branches, and approximately 30 years old are selected. Thanks is given and songs may be sung as the bark is taken. The bark is scored horizontally no more that two hand lengths wide. Pre-contact this would be done with an adze (stone tool); today axes are generally used. The bark is pried back at the cut and the collector pushes her/his hands up between the bark and the tree to separate it into a strip. The strip is then held from the bottom and torn away from the tree as the collector walks backward. Strips over 20 feet long are desirable. Once harvested, the inner bark is pulled from the coarse outer bark. The outer bark is scattered at the base of the tree. The innerbark is then dried, bundled, and stored. It must be thoroughly dried before use so it is often kept for over a year before it is worked. The bark is soaked and made into long strips for weaving.



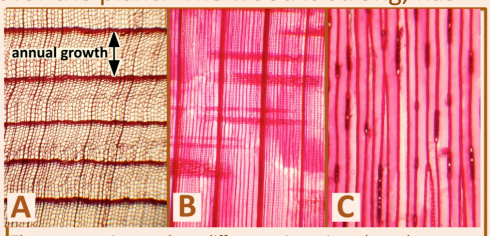
As trees are not girdled (girdling cuts off the flow of nutrients) the tree is not killed with this practice. Once she has given her bark, a tree will not be disturbed again. Trees culturally modified in this way can be recognized by their long scars and signs of healing along the edges.



These cross-sections through the inner bark of western redcedar were stained with phloroglucinol (makes the lignified cell walls of the fibres red, indicated with an arrow). The fibres are in rows which is why cedar is easy to separate into long strips. Other members of the Cupressaceae (family to which both red- and yellow cedar belong) also have fibrous bark. Members of the Pinaceae (spruce, pine, Douglas-fir) do not produce fibres so are not be good for weaving.

WOOD: Wood, xylem, is the other conducting tissue of a plant. Like phloem (food conducting tissue), it is generated from the vascular cambium. It conducts water and minerals from the roots to the upper portions of the tree. The cells in which water moves have thick, lignified cell walls. These tracheids give wood its strength and provides support to the growing tree. Western redcedars can reach a height of 70 metres! The wood is easy to carve with, flexible and rot resistant. It is the primary material used in the construction of totem poles, mortuary poles, canoes, buildings, masks, boxes, cradles, and used in food preparation and a number of tools.

Redcedar wood has amazing qualities and the ingenuity of its uses by First Peoples is truly remarkable. The heartwood (xylem tissue to the inside of the tree that is no longer conducting) provides support for the plant. The wood is strong, has low wood density, low shrinkage value, an even grain, and no resin canals. This makes the wood easy to work (split and carve) with no distortion due to changes in humidity or sticky resin to handle. Additionally it is highly impermeable to water, flexible, and accumulates tropolones which are antibacterial and antifungal (i.e. rot resistant), as well as insecticidal. This combination of qualities makes it an ideal material for construction, storage, and water travel.



These are sections at three different orientations through western redcedar wood. A=cross-section showing growth increments; each represent one year of growth. B and C are two different orientations of longitudinal sections through wood (B=radial, C=tangential). The most important things to note are the homogeneity of the tissue and the lack of resin canals.

Entire trees are cut down for the construction of poles, posts, beams, and canoes. Impermeability to water, carvability, rot resistance, and flexibility (can be steamed to shape) contribute to the excellent performance of the canoe. Planks can be extracted using wedges to split a board from the tree. As with bark removal, the tree remains alive though scarred (see picture). Traditionally big houses were constructed so planks could be removed during warm weather or taken to summer sites to make shelters. Planks could be made into bentwood boxes as well. A plank is notched and then steamed making the wood flexible. It is bent to make sides of the box. A bottom and top are added. This watertight container is an excellent vessel for a number of uses including food and ceremonial object storage, cooking, and serving. Foods, such as berries and dried fish, could be stored without spoilage. Hot rocks were used to boil water inside the box for boiling/steaming food.

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