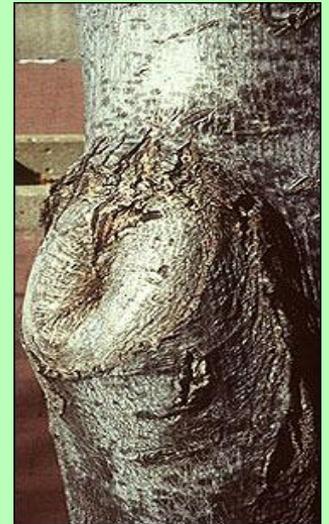




# Natural Target Pruning



## Making Proper Pruning Cuts

# Natural Target Pruning

- In this lesson we will learn:
  - What is Natural Target Pruning
  - Where to make Natural Target Pruning Cuts
  - Why is it important to make Natural Target Pruning Cuts
  - How to make Natural Target Pruning Cuts
  - When is it necessary to make Natural Target Pruning Cuts

# Natural Target Pruning - Definition

- Natural target pruning, as defined and described by Alex Shigo is a radical change from the conventional method used by arborists since the advent of the chain saw to remove branches from hardwood and coniferous trees.
- In natural target pruning the objective is to leave the branch collar on the primary stem or tree trunk while removing the remainder of the branch.



# Natural Target Pruning

## Making Proper Pruning Cuts

- Good pruning involves removing as much of the branch as possible without leaving a stub or flush cutting.



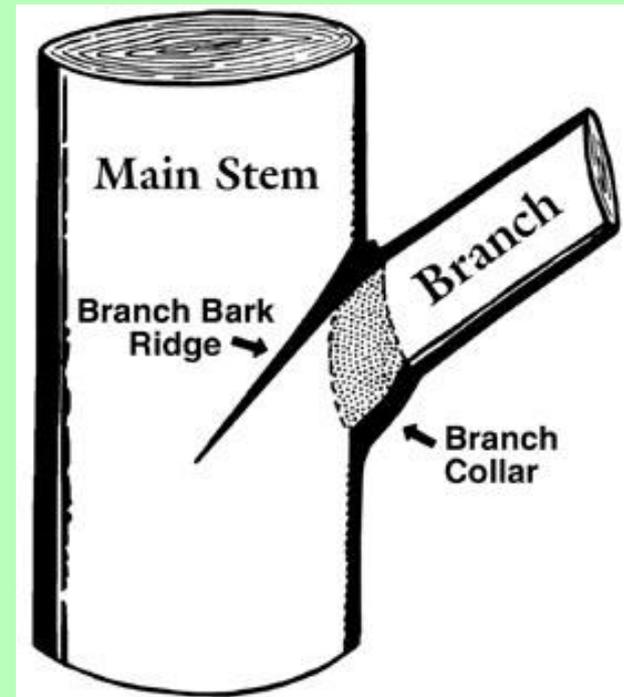
**Stub Cut**



**Flush Cut**

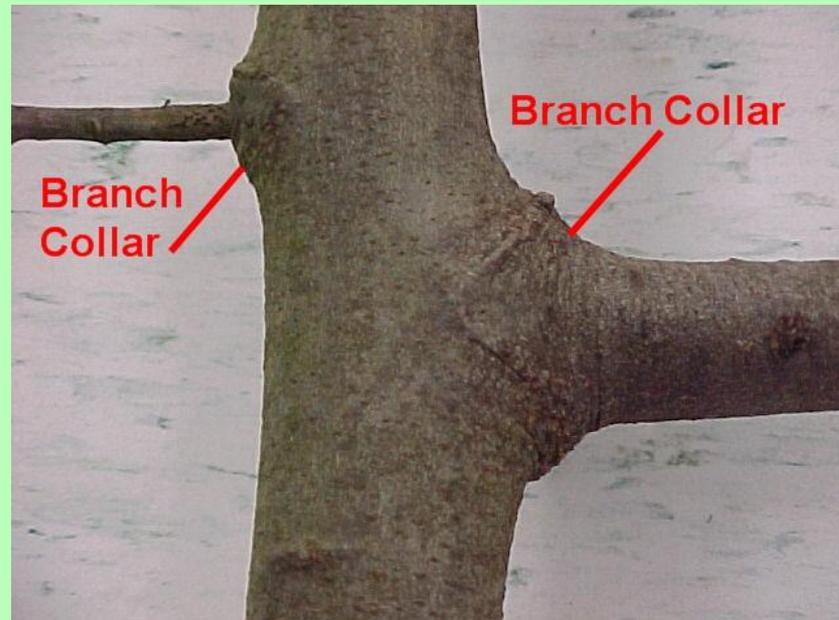
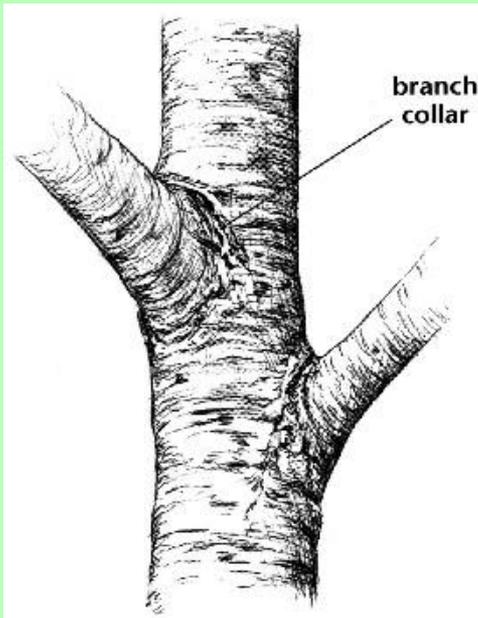
# *Where to Cut: Natural Target Pruning*

- Good pruning cuts are called *natural target cuts* by arborists, who use two targets on the tree to show them where to make the cut.
- These targets are the *branch collar* and the *branch bark ridge*.



# The Branch Collar

- The branch collar is evident on many species of tree, some more than others. It is the base of the branch where the natural branch taper begins to flare out as it connects to the limb or trunk.
- The branch collar is (typically) a swollen, wrinkled area at the branch base where branch and trunk (or branch and branch) tissues come together.



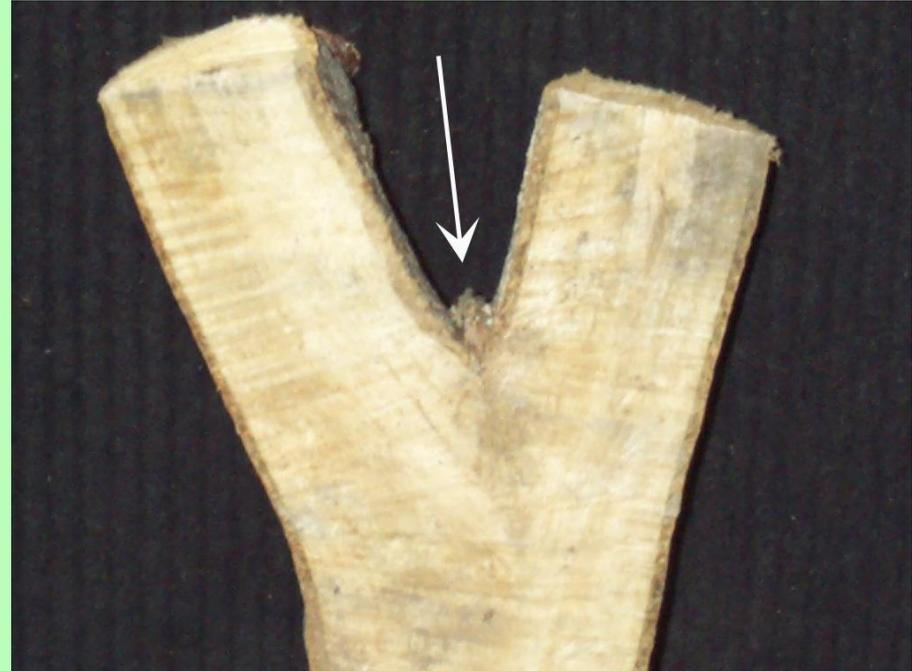
# The Branch Bark Ridge

- Every branch has internal tissues that separate it from the trunk. These tissues are instrumental in the process of wound closure and self-defense and must be protected and maintained during pruning.
- As this internal branch tissue forms, the bark is forced upward to form a raised ridge on the trunk that separates the branch from the trunk. This raised area is the branch bark ridge.



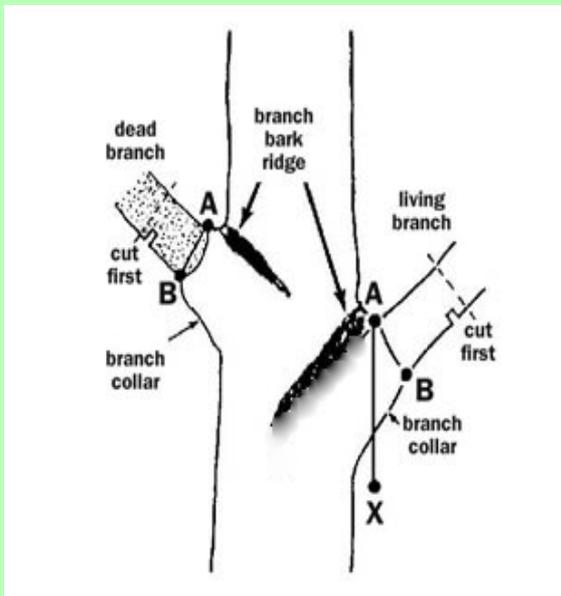
# The Branch Bark Ridge

- The branch bark ridge is an area of excess bark that accumulates where two branches meet. It extends down the branch or trunk on either side of the branch crotch.



# A Natural Target Cut

- A natural target cut leaves the branch bark ridge and branch collar on the tree without leaving a stub.
- The cut passes just outside the branch bark ridge on top and usually slants out and down, leaving a bump but no stub (from A to B on the diagram). The cut is made on the outside of the branch collar.



- **The branch collar should never be injured, cut into or compromised in any way.**

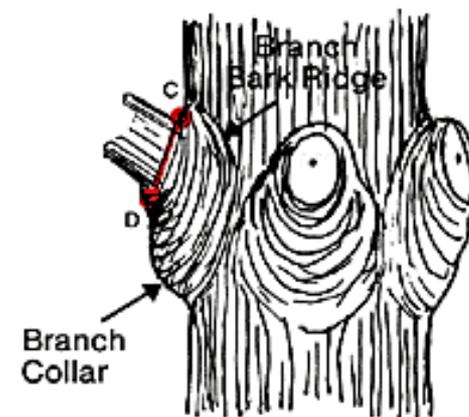
# A Natural Target Cut

- Though the “targets” usually are easy to see on most broadleaved trees, some trees like sycamore constantly lose bark and don’t accumulate a branch bark ridge.



*Do* not injure the branch collar when pruning

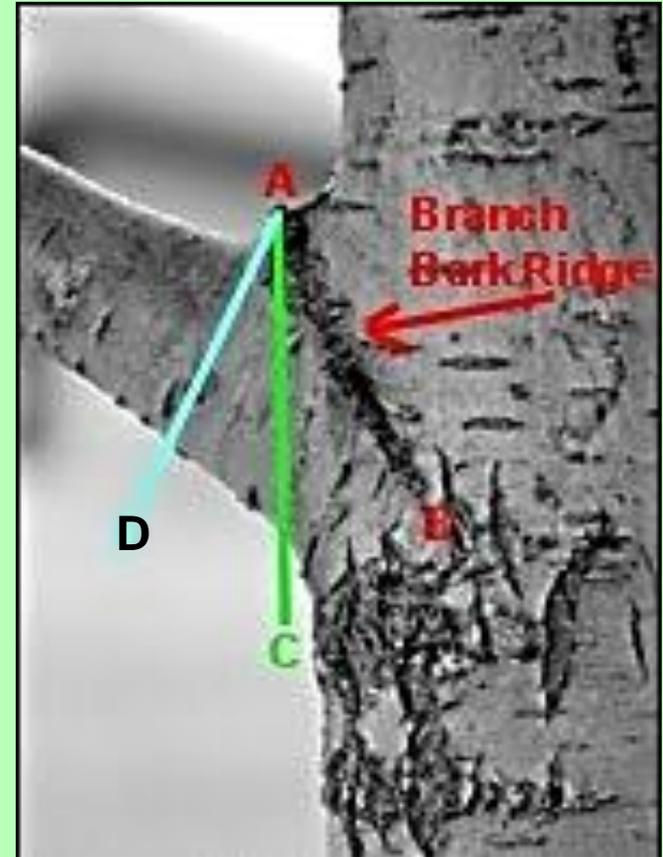
- Conifers also may not accumulate a typical branch bark ridge. In both cases, cut outside any swollen or wrinkled branch collar.



**Conifers**

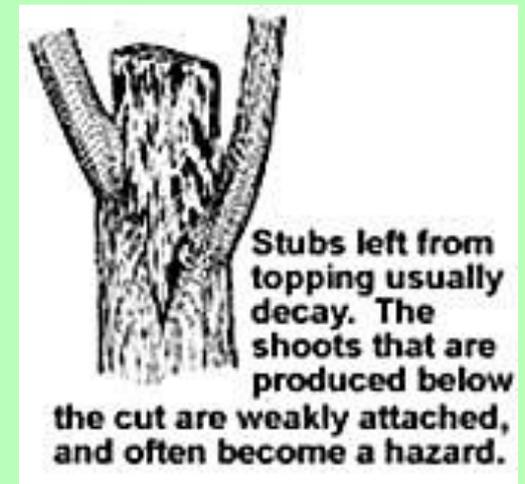
# A Natural Target Cut

- The branch collar is evident on many species of tree. Some trees make it a little harder on us to find the branch collar and the target cut, but for them there is another rule of thumb generalization developed by Dr. Alex Shigo.
- Find the top of the branch bark ridge (A). The top of the cut is made at the top of the branch bark ridge.
- Make an imaginary verticle line from the top of the branch bark ridge straight down to the ground (line A-C). Now determine the angle between this verticle line and the bottom of the branch bark ridge (angle C-B).
- Reverse this angle on the opposite side of the verticle line (angle C-D). The natural target cut is made along the line of this reversed angle (line A-D).



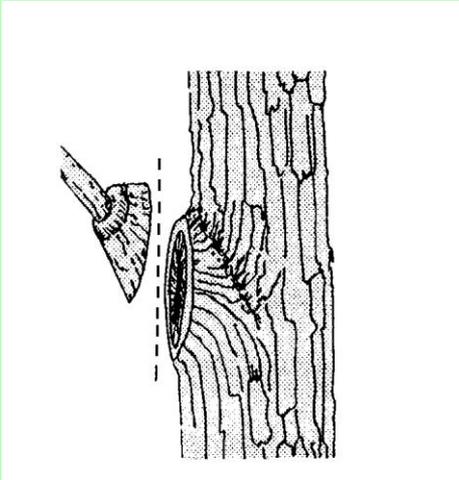
# Stub Cuts

- Stub Cuts are pruning cuts that are made too far outside the branch bark ridge or branch collar. These cuts leave branch tissue attached to the stem.
- Disease organisms “incubate” on the dying stub that remains. Eventually the stub becomes a pathway for decay organisms to enter the tree trunk and cause serious wood decay.
- Heading cuts are pruning cuts that shorten a branch or stem so far back that a large stub is created. In this case, the stub decays, creating health problems for the tree.



# Flush Cuts

- Flush Cuts are pruning cuts that originate inside the branch bark ridge or the branch collar, causing unnecessary injury to stem tissues.
- Flush cuts can, and usually do, lead to a myriad of defects, including radial cracks, circumferential cracks, discolored wood and wood decay.
- Flush cuts are improper and may break the protective chemical barrier and allow decay organisms to colonize stem tissue. The spread of this decay will eventually end in the demise of the tree.

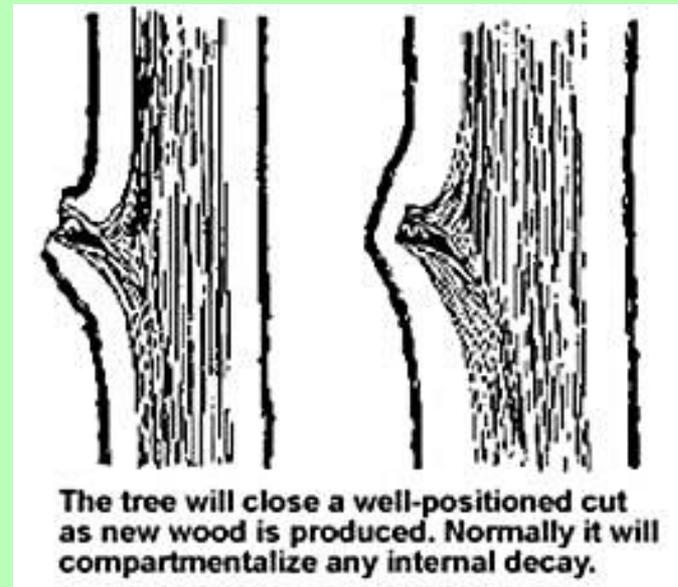
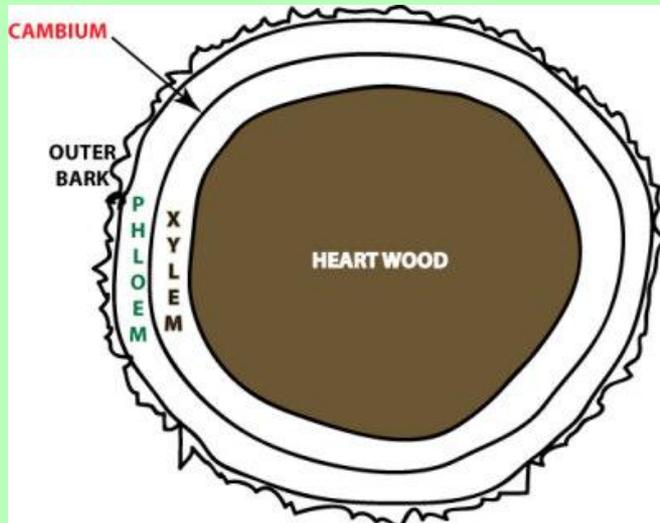


# Making a Proper Pruning Cut

- Proper pruning means removing the branch so that the branch collar is not injured or removed. No cuts should start behind the branch bark ridge.
- When removing dead branches, never cut into the callus tissue which has formed at the base of the branch. Remove the branch beyond the callus ridge so that no living material is severed or detached.
- Three things contribute to the desired result of making a proper pruning cut:
  - 1. The Branch Bark Ridge is retained.
  - 2. The Branch Collar is intact.
  - 3. The final cut line correctly aligned.
- **There are no set pruning angles applicable to every tree - only targets - the branch bark ridge and branch collar. Correctly using the targets as guides should ensure the right final cut every time!**

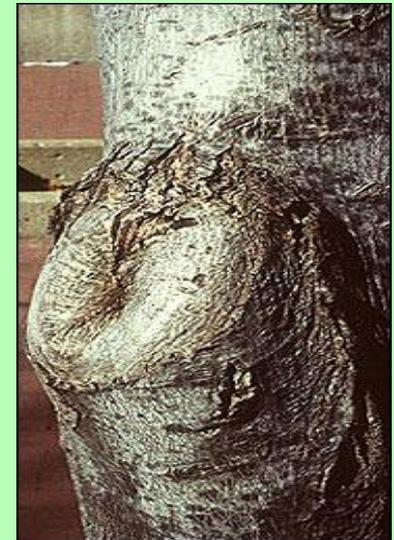
# Healing Response to Pruning

- Healing naturally follows pruning or wounding. It starts in the cambium, a thin layer of cells between the wood and bark.
- Two areas of the cambium, the *bark ridge* at the junction of two limbs, and the *branch collar* function to close off the wound between the plant and the pruning cut.
- For fastest healing, prune close to the main branch without injuring the bark ridge or branch collar areas.



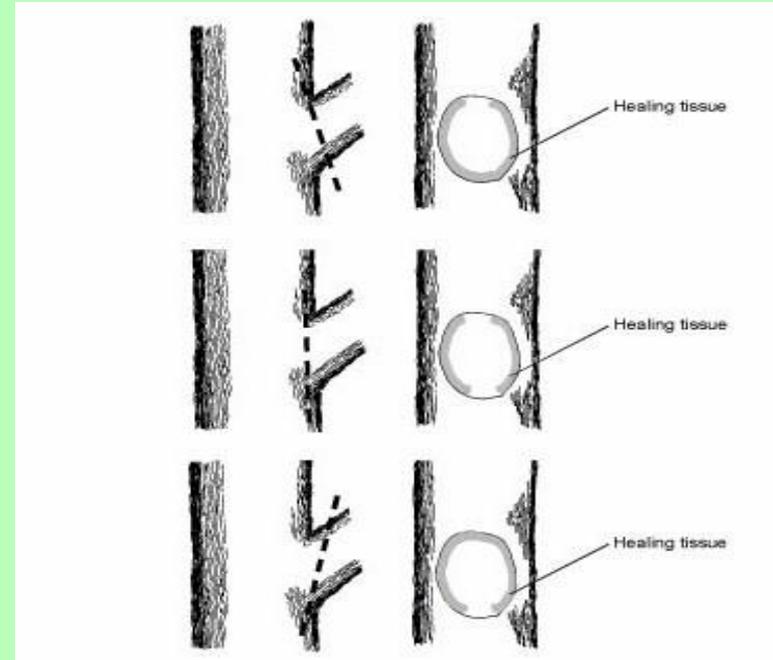
# Healing Response to Pruning

- Natural target cuts start to seal over quickly as *woundwood*, sometimes called *callus*, forms at the wound edges (callus forms first and becomes woundwood as it matures and becomes woody).
- Woundwood usually forms in a continuous ring around a natural target cut, eventually sealing over the wound as it grows together.



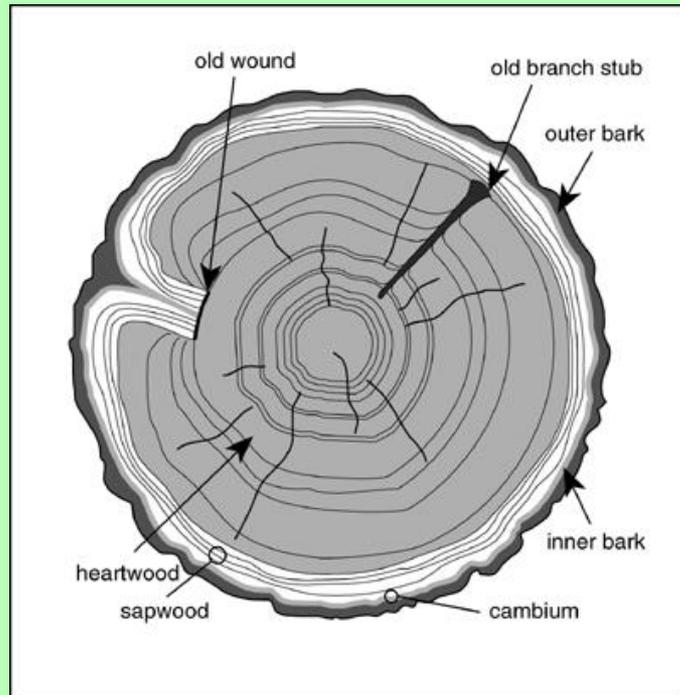
# Healing Response to Pruning

- Gaps in the woundwood at the top and/or bottom indicate flush-cuts, cuts that were made too close to the stem.
- Though such wounds may eventually seal, they have a greater chance for dieback, decay, and crack formation than natural target cuts.



# Healing Response to Pruning

- The term “seal,” rather than “heal,” is used to describe tree wound closure, since the wound still exists inside the tree even after it no longer shows on the outside.



# Compartmentalization of Wounds

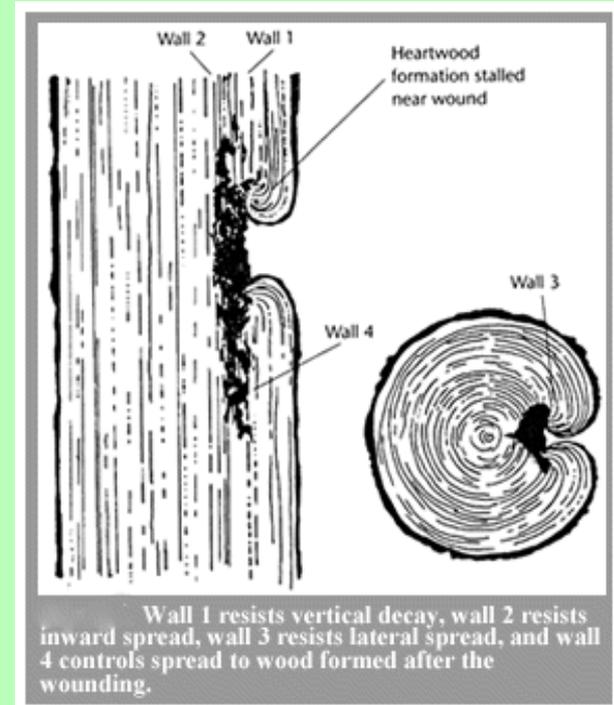
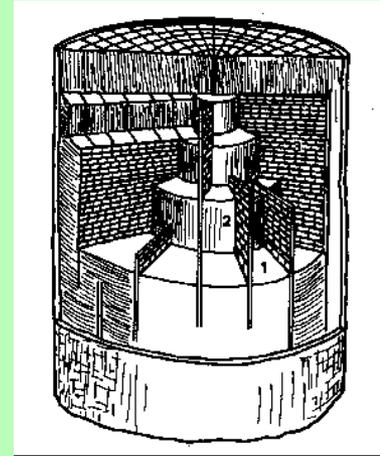
- Trees have a natural defense response to wounds and pruning cuts. They form four types of walls to compartmentalize the area thus preventing the spread of decay organisms.
- The decay or injury remains but is sealed off and does not increase in size if the walls are stronger than the decay organisms.
- Natural target pruning initiates the wound response and promotes the compartmentalization of the wounded area as quickly as possible.



# Compartmentalization of Wounds

## The 4 Walls

- Wall 1 is formed by plugging the vertical vascular system vessels following an injury. It is the weakest wall but can slow the vertical spread of decay.
- Wall 2 is formed at the outer edge of a growth ring. It is a weak barrier but does offer resistance to inward spread of decay.
- Wall 3: Each growth ring is subdivided into compartments with a radial wall. It presents a maze of physical obstacles as well as a chemical barrier and provides resistance to lateral spread of decay. Wall 3 is the second strongest of the four walls.
- Wall 4 is formed by cambium growth after an injury. It is the strongest of all the walls. Internally, it separates the wood present at the time of injury from new wood formed as the tree grows. Externally, callus tissue develops around the injury and should eventually cover it by growing over the dead wood.
- Some tree species can activate Walls 1, 2, and 3 very rapidly and maintain them so effectively that the amount of decay is limited. When a tree responds slowly or the walls are weak --- infection can damage a large volume of wood.



# Wound Dressings

- Wound dressings or pruning paint are cosmetic and do nothing to promote healing of the pruned area.
- Research has shown that such dressings can actually promote decay by keeping the wound protected and moist — perfect conditions for the growth of decay microorganisms.



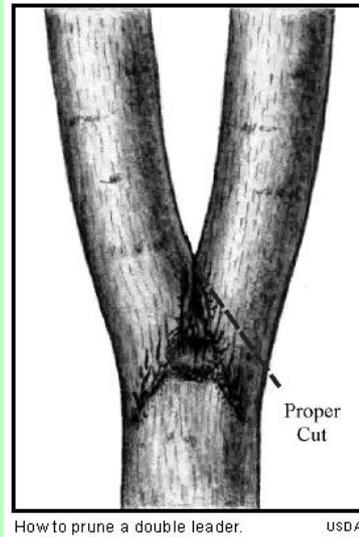
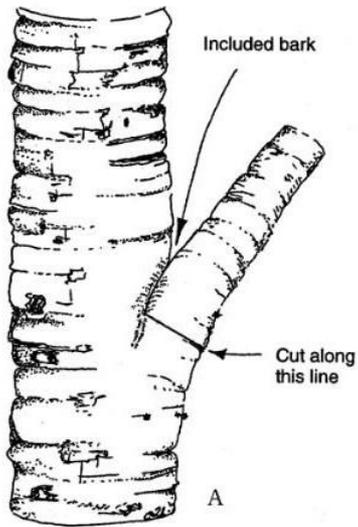
# *Included Bark*

- Sometimes the bark where two branches meet turns in instead of out, forming a seam of *included bark* inside the tree instead of a branch bark ridge. Areas of included bark often die and become decayed.
- These areas are naturally weaker than branch attachments with normal branch bark ridges.
- Included bark is especially common on certain species or cultivars, but can be found on any tree. It is more common where branches attach to one another at a very narrow angle, but it can occur with wide attachment angles.



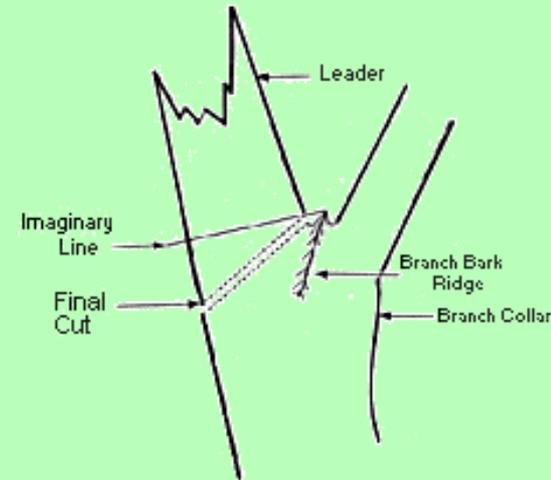
# Included Bark

- Included bark prevents strong attachment of branches, often causing a crack at the point below where the branches meet.
- Codominant stems that are approximately the same size and arise from the same position often form included bark.
- Remove a branch that has included bark by cutting from the open crotch down and out (or cut up to the crotch).
- This actually leaves a small stub on or in the tree, but cutting farther down may cause serious trunk wounds.



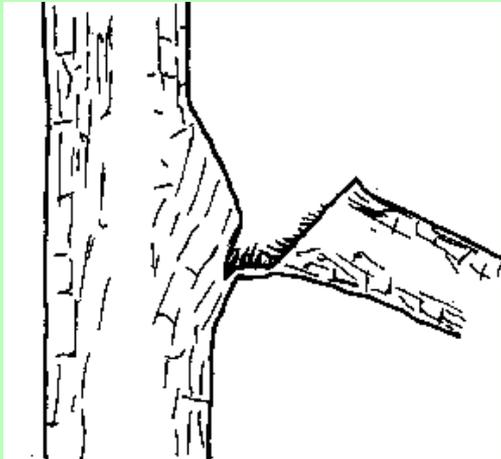
# Pruning Leaders or Co-dominant Stems

- Pruning to remove a leader or main stem sometimes is called crown reduction or drop-crotch pruning.
- A leader can be pruned off where another branch is attached if the remaining branch is healthy and vigorous and at least 1/3 the diameter of the leader to be removed (so a 6" leader could be removed at a 2" branch).
- When cutting back to a lateral, a natural target pruning cut is made by bisecting the angle between the branch bark ridge and an imaginary line made perpendicular to the leader or the branch being removed.
- The cut should slope out and down away from the branch bark ridge, with the bottom of the cut straight across from the bottom of the branch bark ridge.
- No more than about one-quarter of the foliage should be removed from the branch that is being shortened.
- Co-dominant stems are pruned similarly. Removing some of the lateral branches from a co-dominant stem can reduce its growth enough to allow the other stem to become dominant.



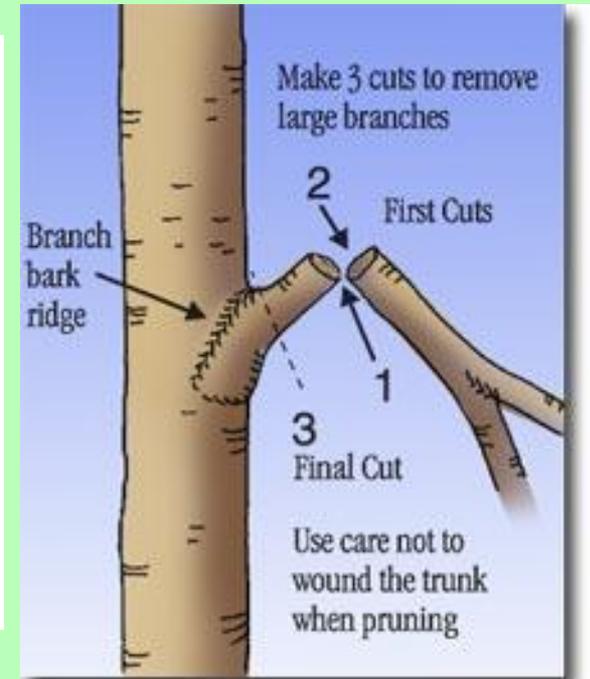
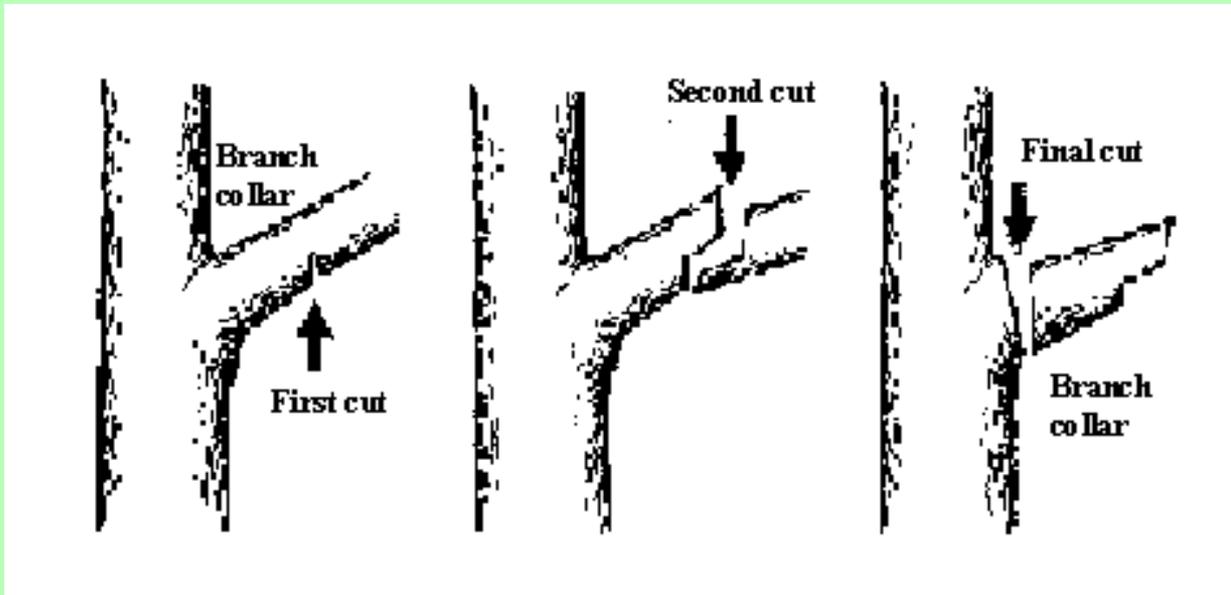
# *Pruning Large Branches*

- To remove large branches (over one inch in diameter) use the three-step cutting method.
- This removes the weight of the limb before the final cut and eliminates the possibility of stripping the bark down the side of the main trunk.



# The three-step cutting method:

- 1. Undercut one-third of the way up through the branch one or two feet out from the trunk to prevent bark stripping.
- 2. Cut down and remove limb. A top cut directly into or slightly outside of the undercut will remove most of the branch weight.
- 3. Trim branch stub at branch collar. Make a final natural target cut that removes the stub. Final cuts can be made from the bottom up to the crotch if the branch angle is tight and tools won't fit in the crotch.



# Natural Target Pruning

- Natural target pruning is a way to minimize the detrimental effects caused by pruning wounds.
- Remember, that a wound on a tree is a wound forever. Trees seal or compartmentalize a wound, they do not heal a wound.
- The goal of any responsible pruner is to reduce the harmful effects of their pruning wounds. This is done by pruning in such a way as to facilitate the closure and compartmentalization of these wounds as quickly as possible by following the principles of natural target pruning.
- **Do not:**
  - make flush cuts behind the branch bark ridge.
  - leave living or dead stubs.
  - injure or remove the branch collar.
  - paint cuts.