Stem Decays

Identification, Biology, & Management

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Photo credits
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Wood-decay fungi and their ecological niches in trees

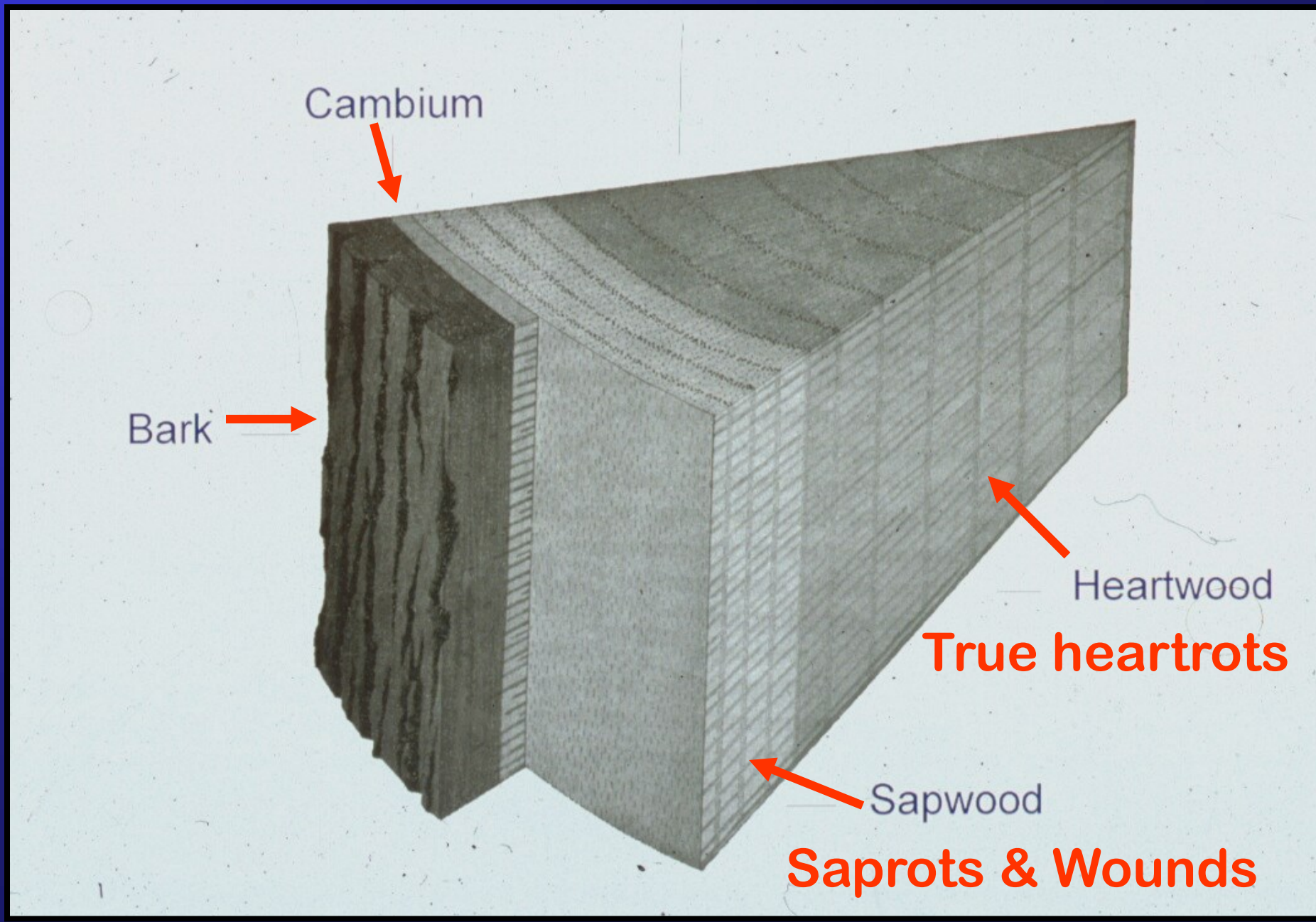
True heartrots
Saprots
Wound decays

Root & butt rots

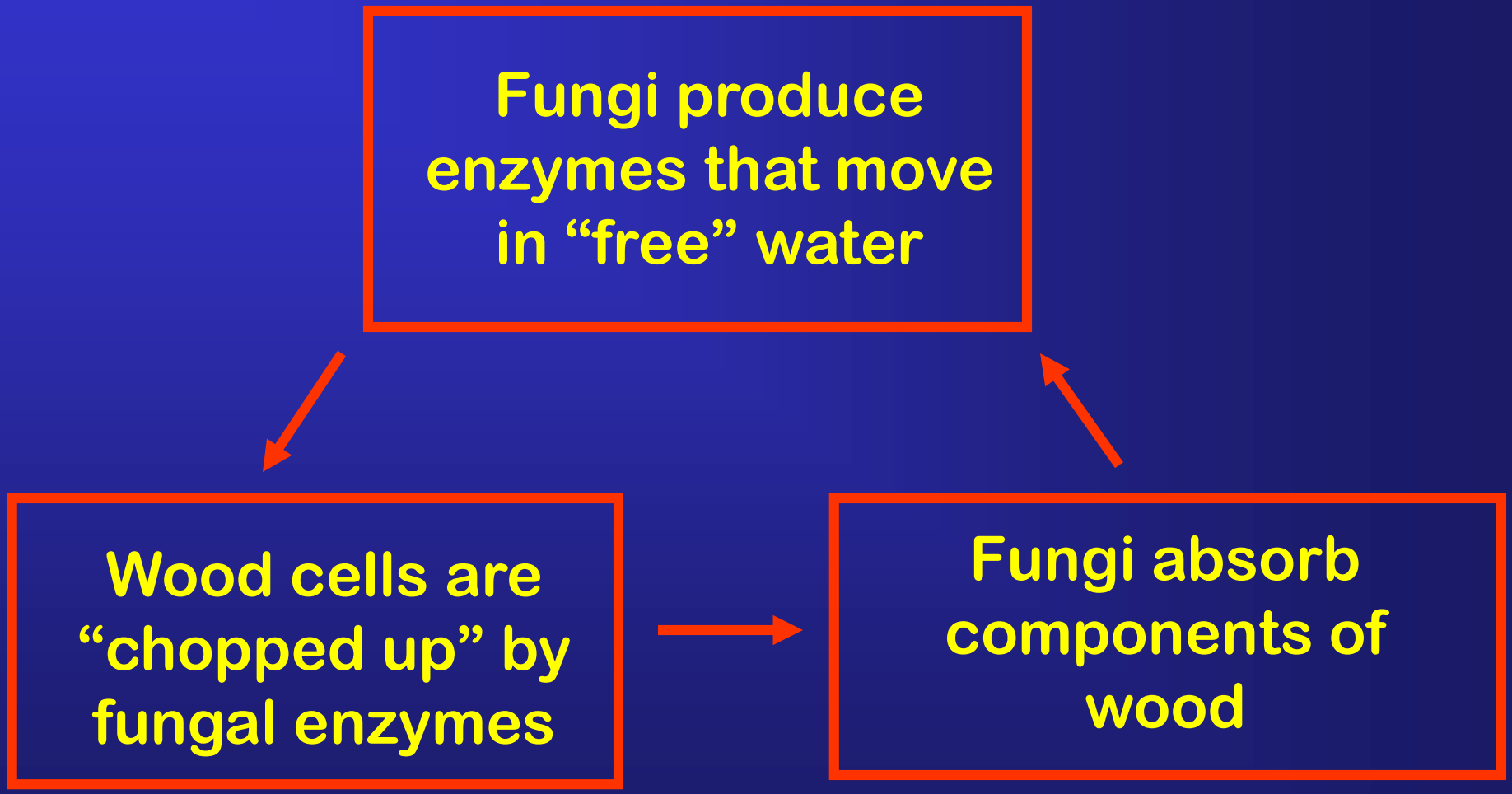
Root disease

Conifer Decay Fungi

- Infection processes not always well understood.
- Becomes more common as stand ages.
- Difficult to control except by capturing volume loss via early harvest and avoiding wounding.
- Reduce merchantable volume but benefit soils and wildlife.


Cambium
Bark
Heartwood
True heartrots
Sapwood
Saprots & Wounds

Wood Decay Process of Fungi



What makes up a conifer wood cell?

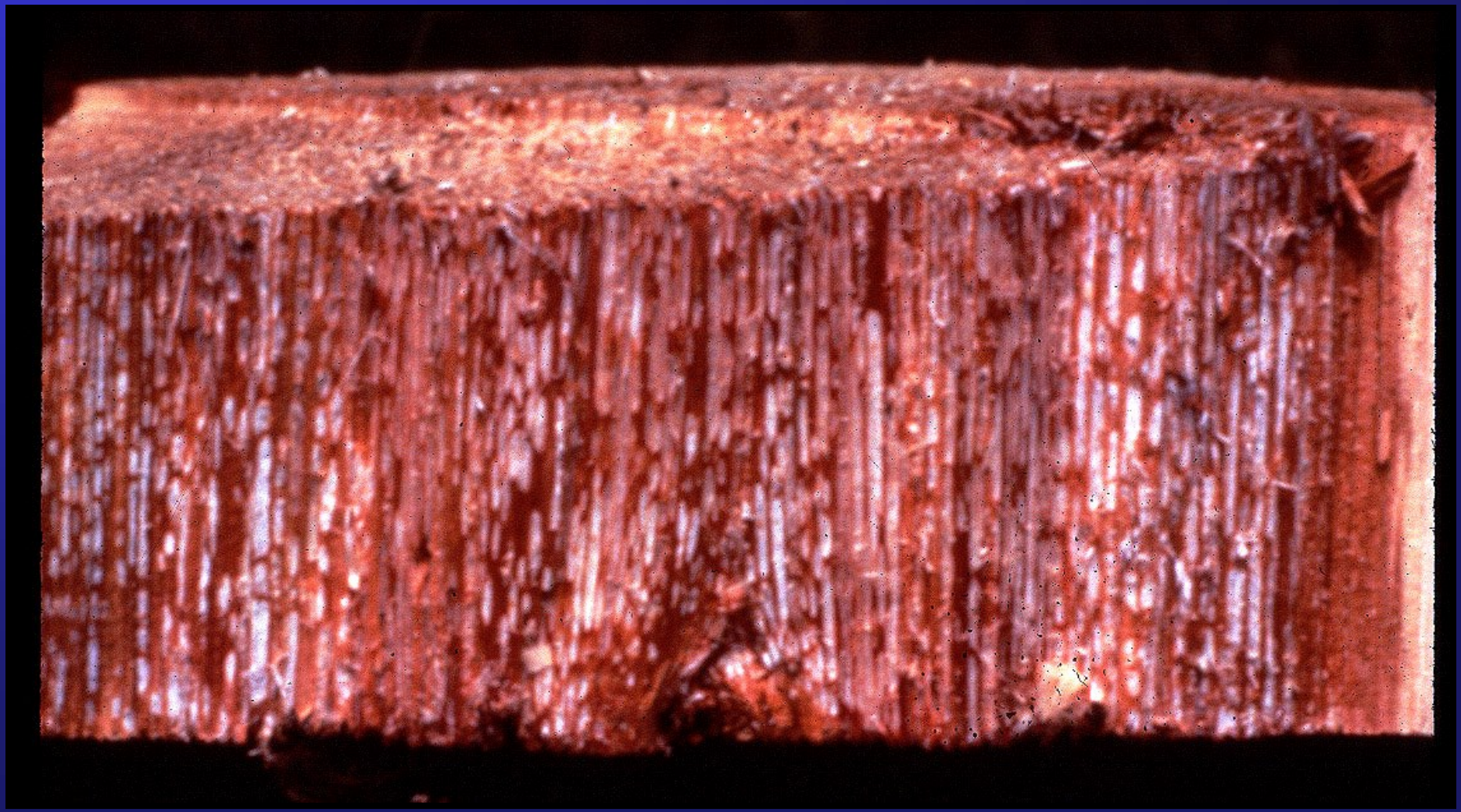
- Cellulose (Cotton is cellulose)
- Hemicellulose (Other sugars)
- Lignin (Complex phenolic molecule)

Two broad categories of wood decay

1) White Rot

- Degrades cellulose & hemicellulose as well as lignin
- Decay
  - tends to retain shape
  - becomes progressively more “spongy”
  - May form small white “pockets”

White pocket rot



2) Brown Rot

- Degrades cellulose and hemicellulose, but little lignin

- Decay
  - brown to reddish color
  - develops checks perpendicular to grain
  - forms cubes of decayed wood
  - tends to feel dry

Brown rot

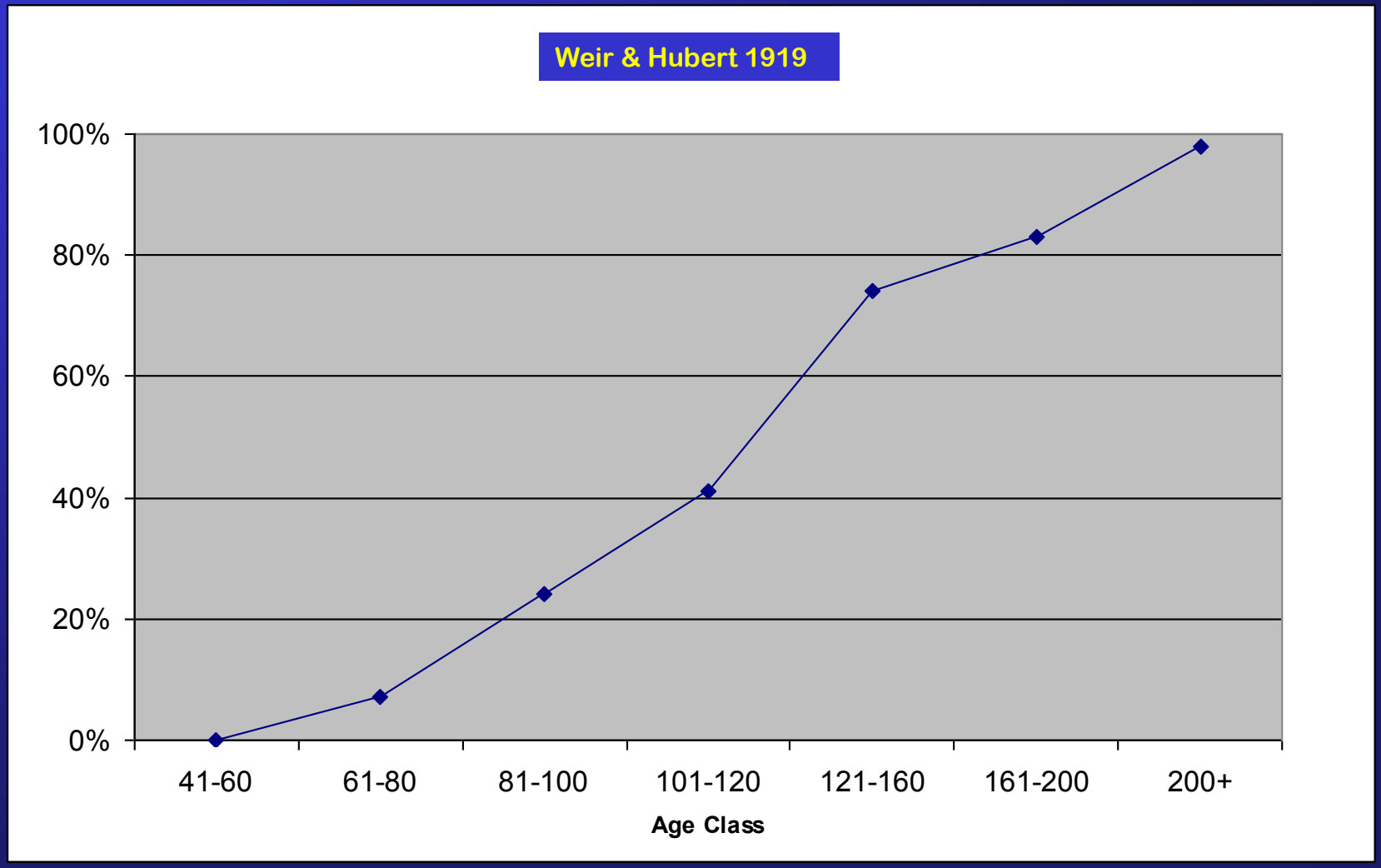
Decay -- Effects & Functions

- Breaks down wood
- Recycles nutrients
- Creates nurse logs
- Adds water-holding capacity to upper soil horizons

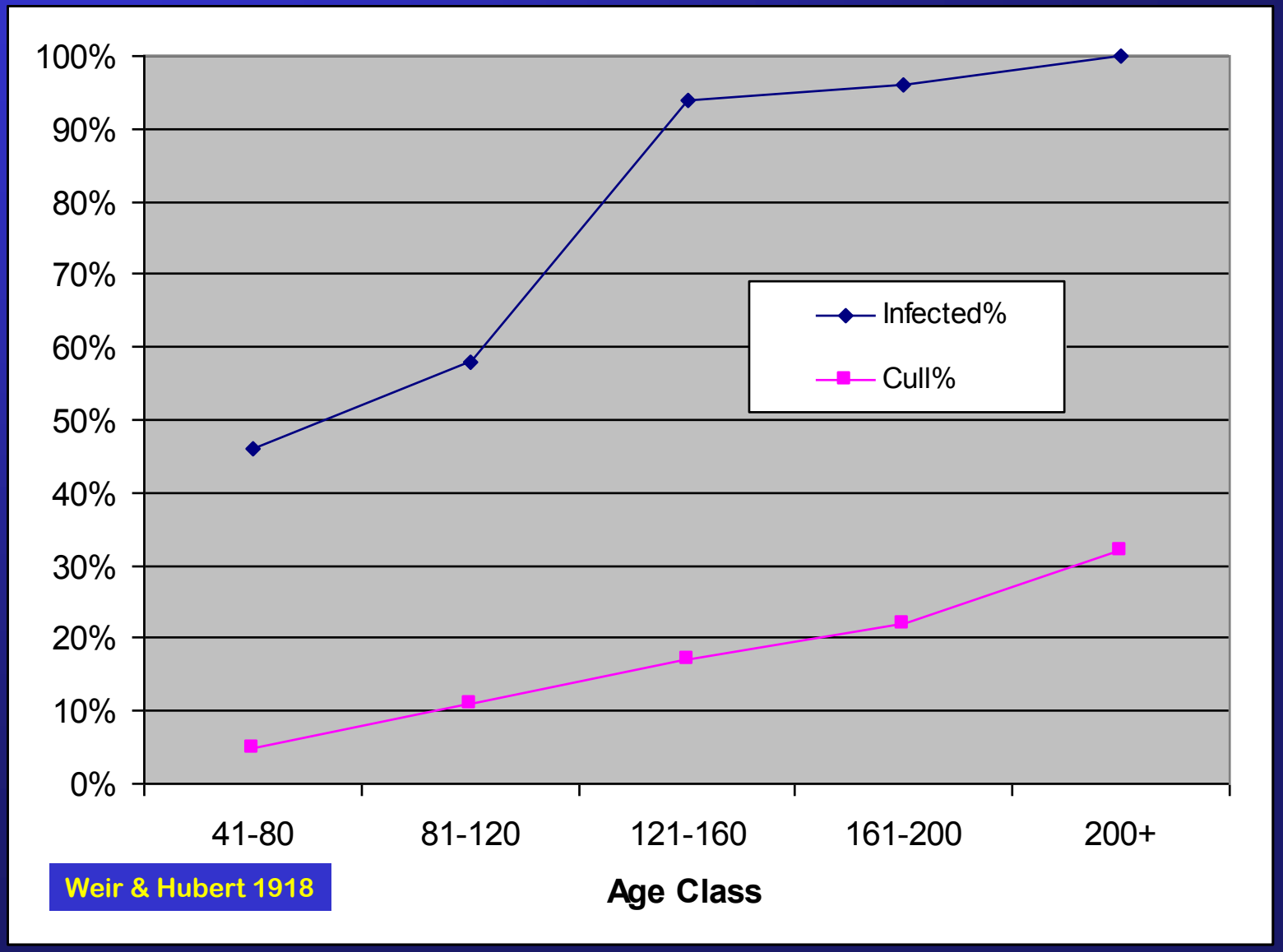
Decay -- Functions & Effects

- Decay becomes more prevalent as stand ages
  - a function of heartwood formation and increased opportunities for infection
- Can greatly reduce merchantable volume

Red Ring Rot/Schweinitzii - White Pine



Indian Paint Fungus - Western hemlock



Decay Functions & Effects

- Hollow trees do not form without heartrot.
- Habitat formed by heartrot fungi benefit wildlife while trees are both alive and dead, standing and down.

Decay provides wildlife habitat

Heartrots create hollow trees

Tree Failures

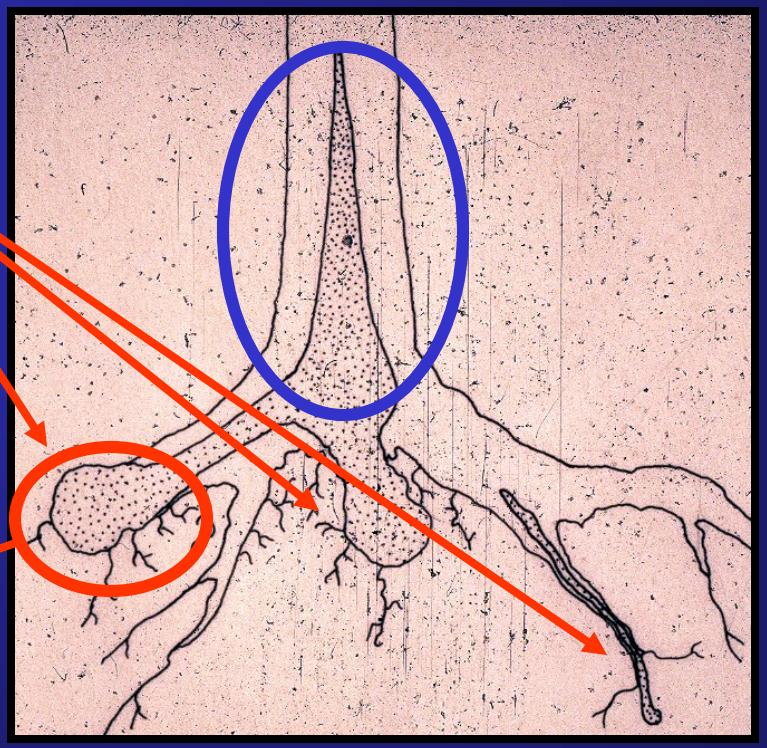
- Add course woody debris to forest floor
- Create canopy gaps
- Add complex structure to stands

Root & Butt Rots

Disease: Schweinitzii root & butt rot
Fungus: *Phaeolus schweinitzii*

- Hosts are principally
  - *Douglas-fir*
  - *Spruce*

Infection process

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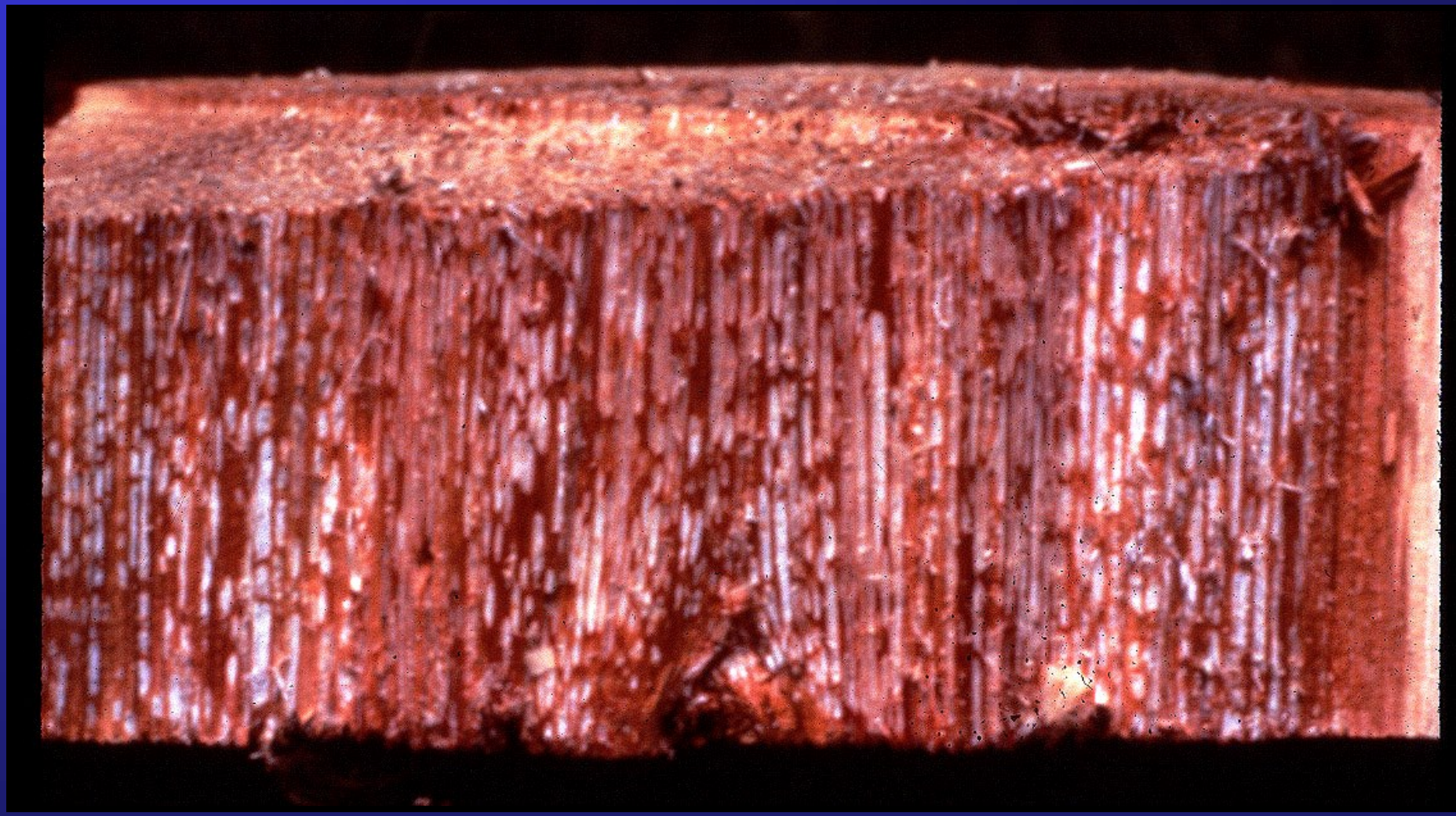
True Heartrots

Disease: Red ring rot
Fungus: *Phellinus pini*

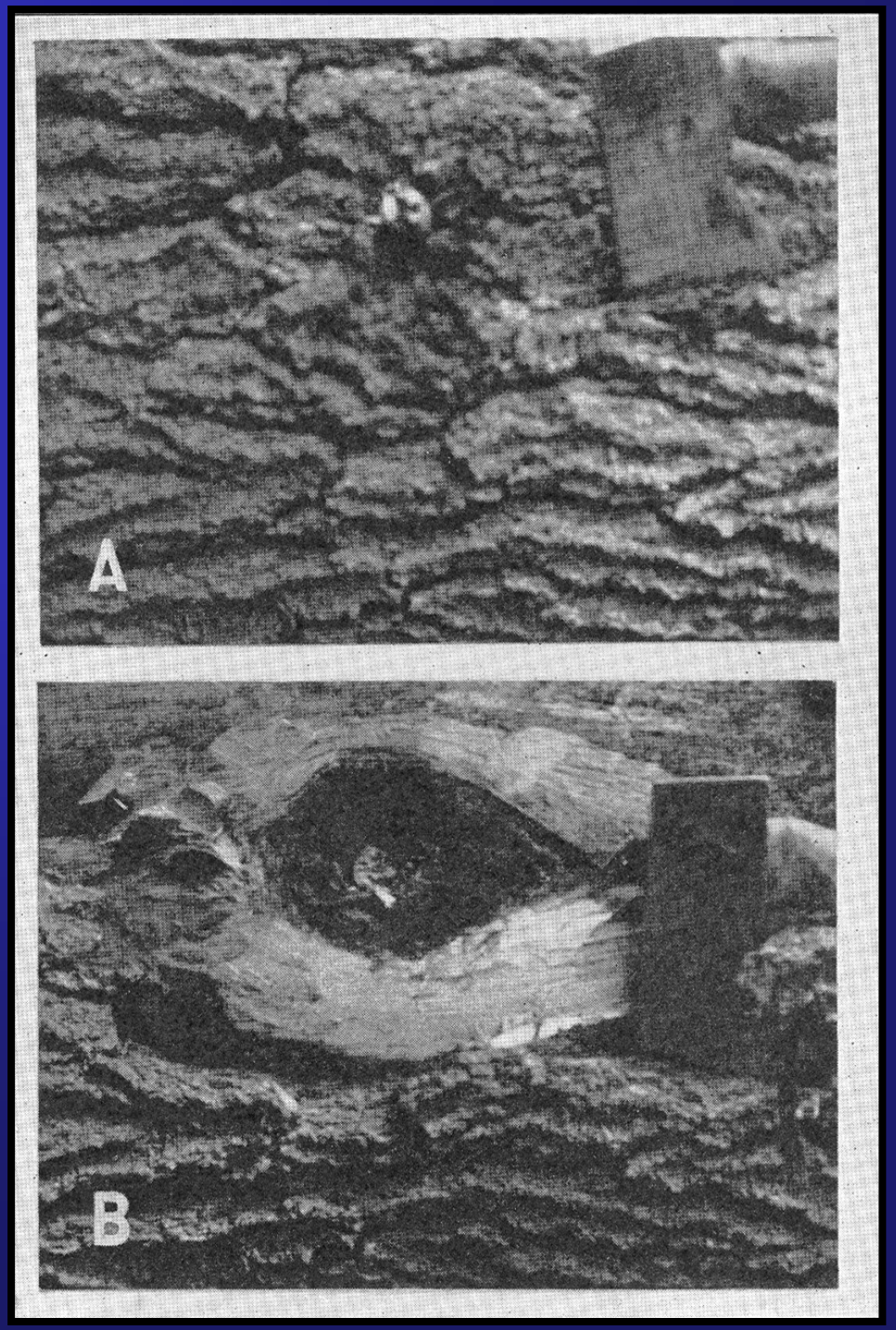
- **Frequent hosts:**
  - Douglas-fir, hemlock, spruce, larch
- **Occasional hosts:**
  - Pines (particularly white pine)
  - Western redcedar
- **Less susceptible:**
  - True firs



~2-3’ up and 3-5’ down from each punk knot or conk

Several conks = 100% cull

Punk knots



Disease: Indian paint
Fungus: *Echinodontium tinctorium*

- Major hosts:
  - True firs
  - Hemlocks

Indian paint fungus:

~16’ of decay on either side of conk

Several conks along stem = 100% cull

Disease: Brown heartrot
Fungus: *Fomitopsis officinalis*

- Hosts principally:
  - western larch
  - ponderosa pine
  - Douglas-fir

Perennial conks add new growth each year

Wound Decay & Saprots

Disease: Brown top rot
Fungus: *Fomitopsis cajanderi*

- Hosts include:
  - Douglas-fir
  - grand fir
  - pines
  - spruces
  - hemlocks

Spores infect hosts via broken tops and branch stubs.

Nearly all broken tops >1” in diameter are likely to be infected

Disease: Brown crumbly rot
Fungus: *Fomitopsis pinicola*

- Hosts are principally:
  - All dead conifers

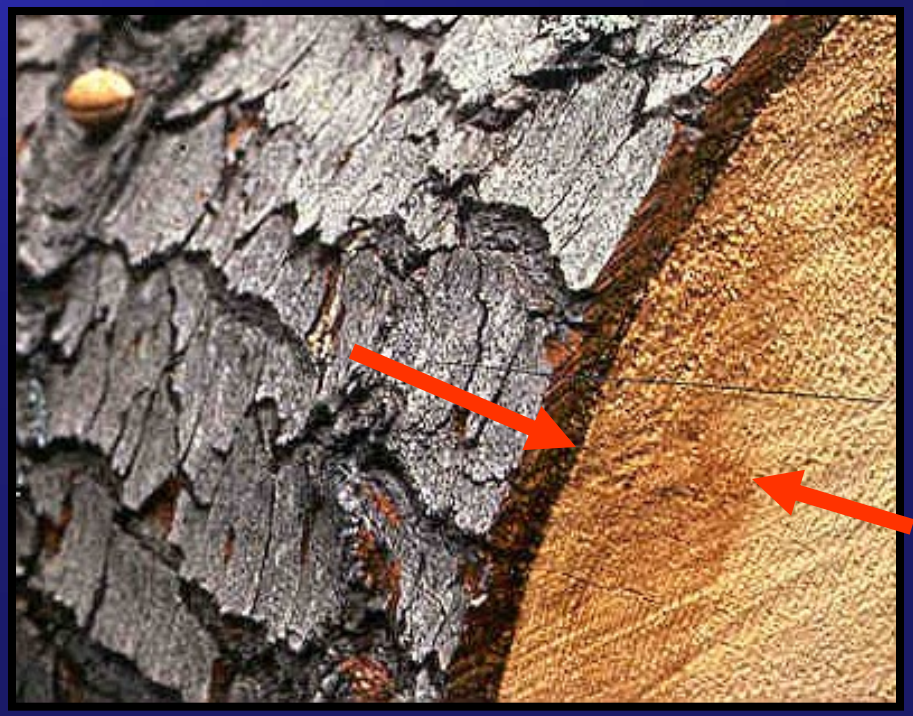
Found on dead material such as standing trees, stumps, and logs.

Disease: Gray sap rot
Fungus: *Cryptoporus volvatus*

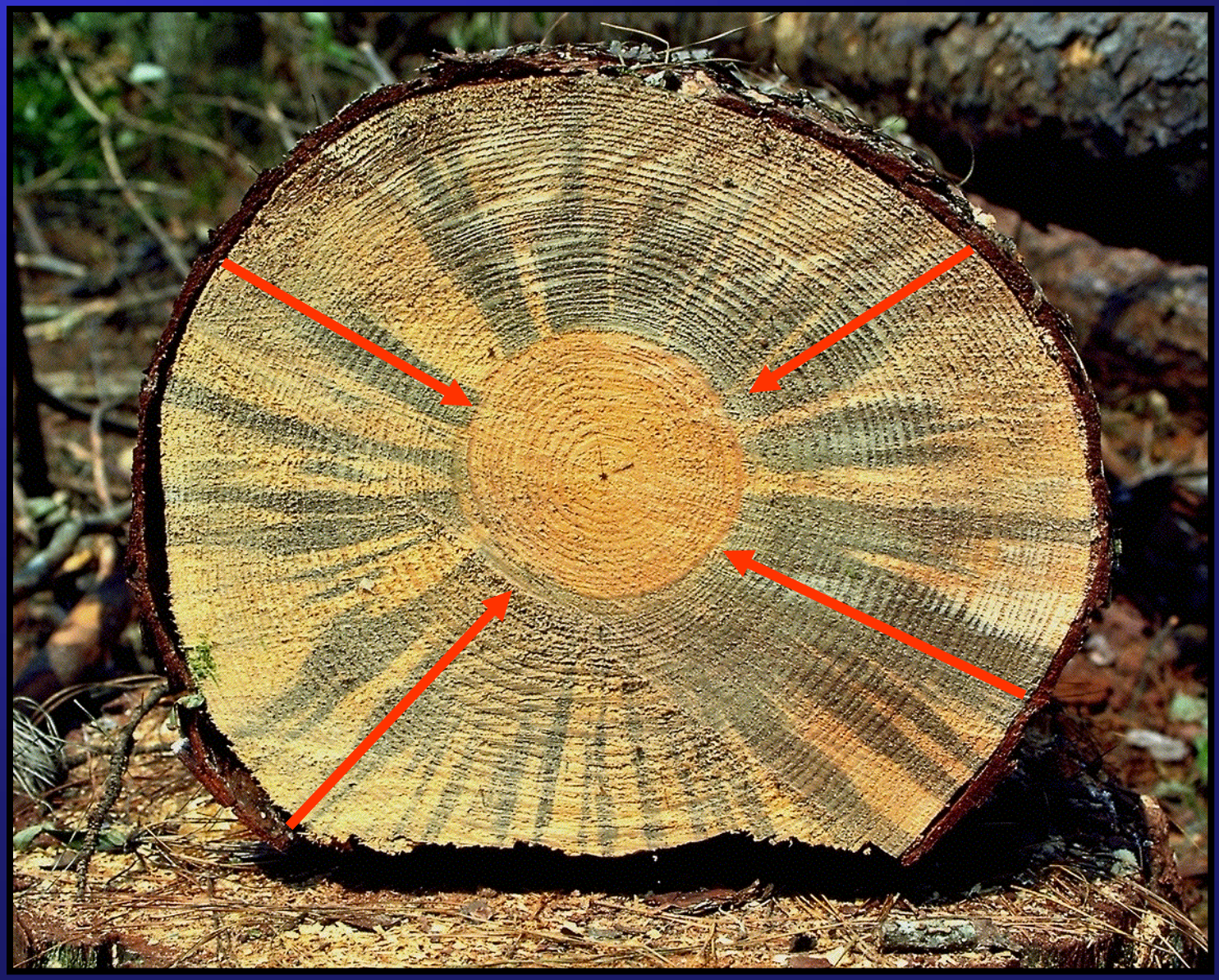
- Hosts are beetle-attacked conifers

Fruiting bodies emerge from beetle exit holes 2-3 years following beetle attack – fungus decays sapwood.

Decay progresses rapidly after tree dies or is harvested; depending on sapwood width loss of merchantable volume can exceed 40%.



Blue-staining following beetle attack



Decay Management

- Shorten rotations to limit decay development (pathological rotation)
- Prevent injuries to residual trees
  - Match logging equipment to topography, tree size, and soils
  - Mark for leave trees, not cut trees
  - Plan skid trails before logging
  - Silviculturist, forest engineer, and sale administrator have important roles to play.