Introduction to Borers and Their Control

What kinds of insects are borers?

- Moths
  - Shoot tip moths (several families)
  - Clear wing moths
  - Others, pyralid moths, carpenter worms
- Beetles
  - Metallic wood boring beetles (Flat headed borers)
  - Long horned beetles
  - Bark beetles
  - Ambrosia beetles
  - Sap beetles
  - Weevils
- Wasps
  - Horn tails
  - Sawflies

Borers

- Which trees get borers?
- How can sanitation reduce borer problems?
- Can you control borers with reduced site stress?
- How can resistant varieties be used?
- What is the potential for biological control?

How do borers find stressed trees?

- Trees that have been freshly wounded or are under water stress tend to give off a stronger smell.
  - Fresh cuts release volatiles.
  - Water stress causes greater rates of anaerobic glycolysis and ethanol production. Ethanol extracts essential oils of plants and increases the strength of the scent

Borer Chemical Control

- Trunk insecticides
  - Emulsifiable concentrate formulation long lasting
  - Pyrethroids, bifenthrin (Onyx), permethrin (Astro)
- Systemic insecticides
  - Imidacloprid – Kills beetle borers only
    - Does NOT kill caterpillar borers
      - Won’t work if vascular system is damaged

How topical insecticides kill borers

- As adults feed on leaf tissue
  - Metallic wood boring beetles (Flat headed borers)
- As they chew their way into the tree
  - Adults chew an egg laying niche, or mating chamber (Beetles)
    - Larvae of many beetles bore directly into trunk of tree after eggs are laid so they avoid insecticide
  - Larvae chew into the bark after egg hatches (Moths)

Soil Injection

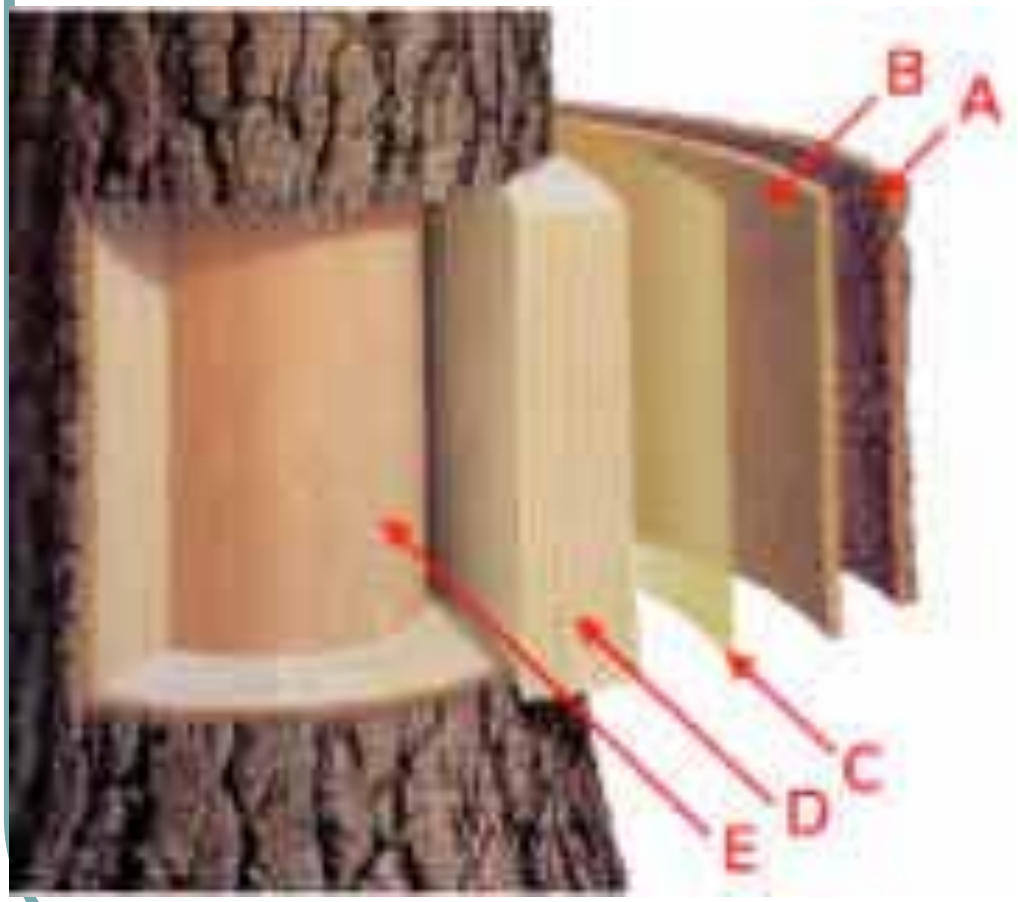
How topical insecticides kill borers

- As adults chew their way out of the trunk
  - Beetles, Wasps
- Note: Horn tail and Sawfly wasps have ovipositors that deposit eggs beneath bark and insecticide,
  - But adults are likely to contact enough insecticides to be killed as they look for an oviposition site

How systemic insecticides kill borers

- Material is injected into trunk or soil.
- Moves through xylem and diffuses into phloem so that vascular system is penetrated
- Diffusion through vascular system and protection is poor on injured trees.
- Wounds may add stress to trees and contribute to borer injury

Anatomy of a tree trunk



A- Outer Bark- water proof, made of old phloem

B- Inner bark – phloem

C- Cambium cell layer-
- Growing part, makes phloem and xylem

D- Sapwood -Young Xylem,

Conducts water, fertilizer, and pesticides

E- Heartwood

-Old Xylem, Does not conduct water,Provides structural support

http://www.arborday.org/trees/ringstreenatomy.cfm

Porosity of Sapwood

Describes where in sapwood injected materials can be taken up in transpiration stream.

Ring Porous Species-

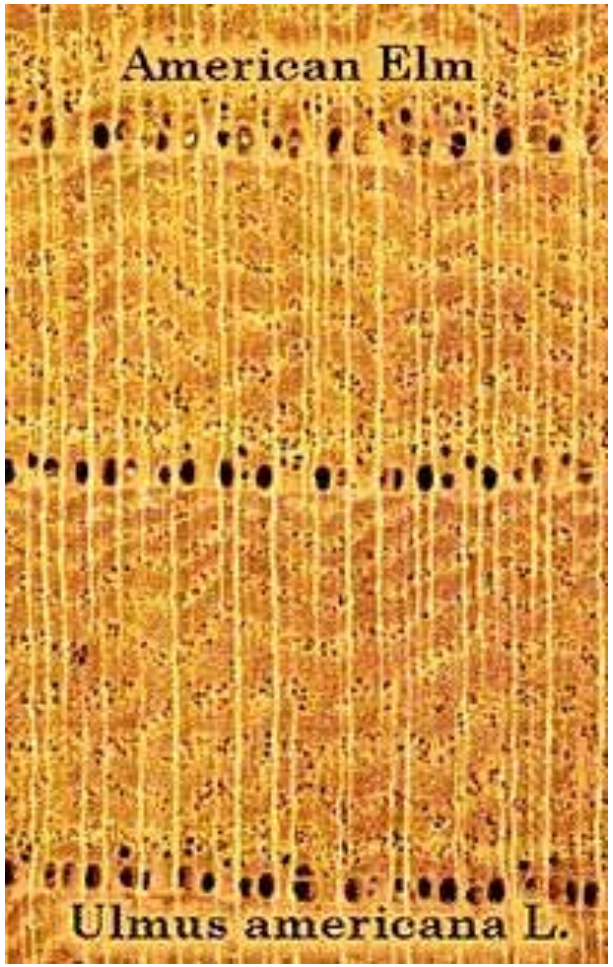
99% taken up by vessels beneath bark in current annual growth ring

Diffuse or Non Porous Species

Taken up by vessels in most recent 3-4 growth rings

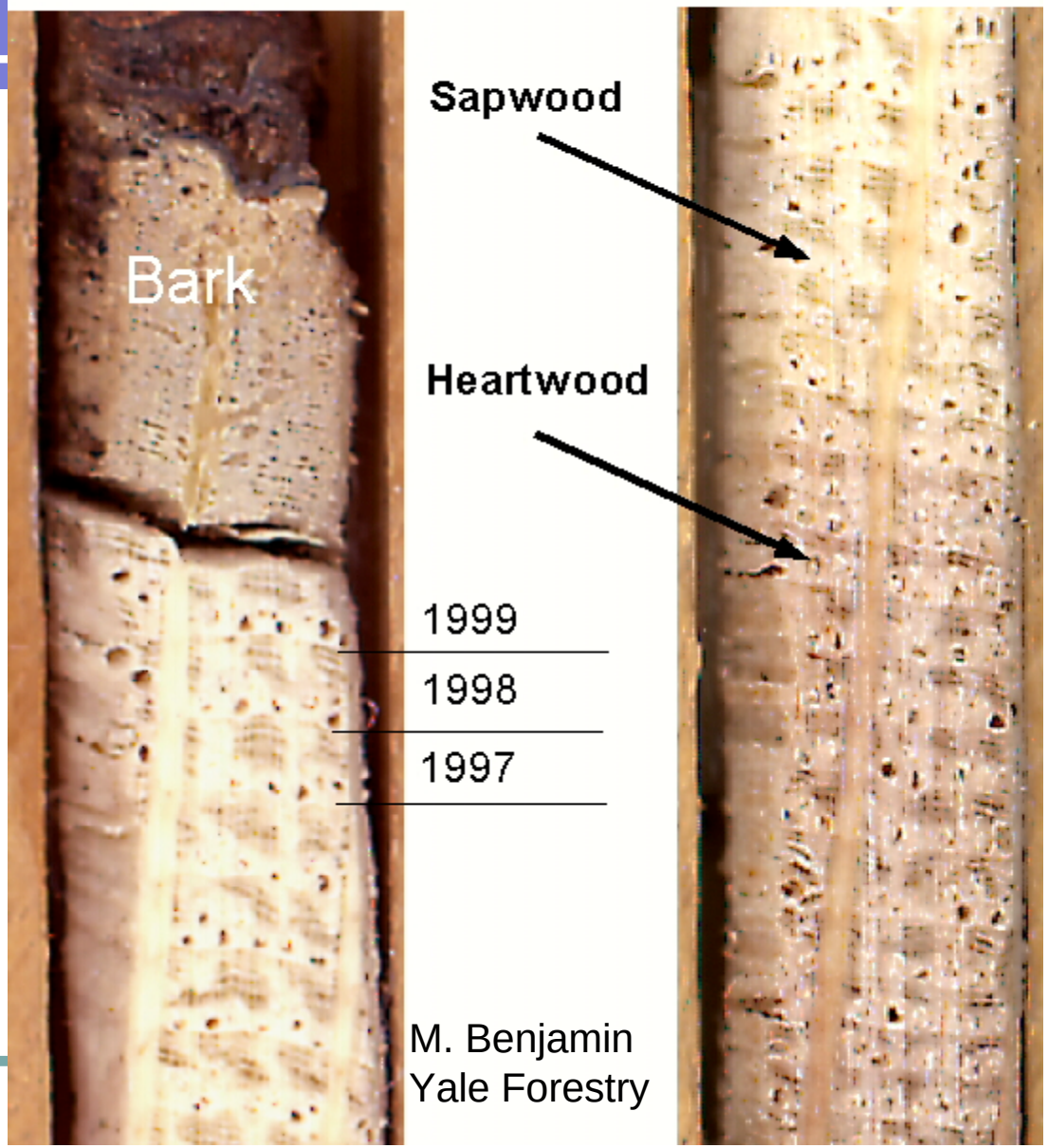
Source; W. Chaney, 1999. Arbor Age 11: 25-32

Ring Porous

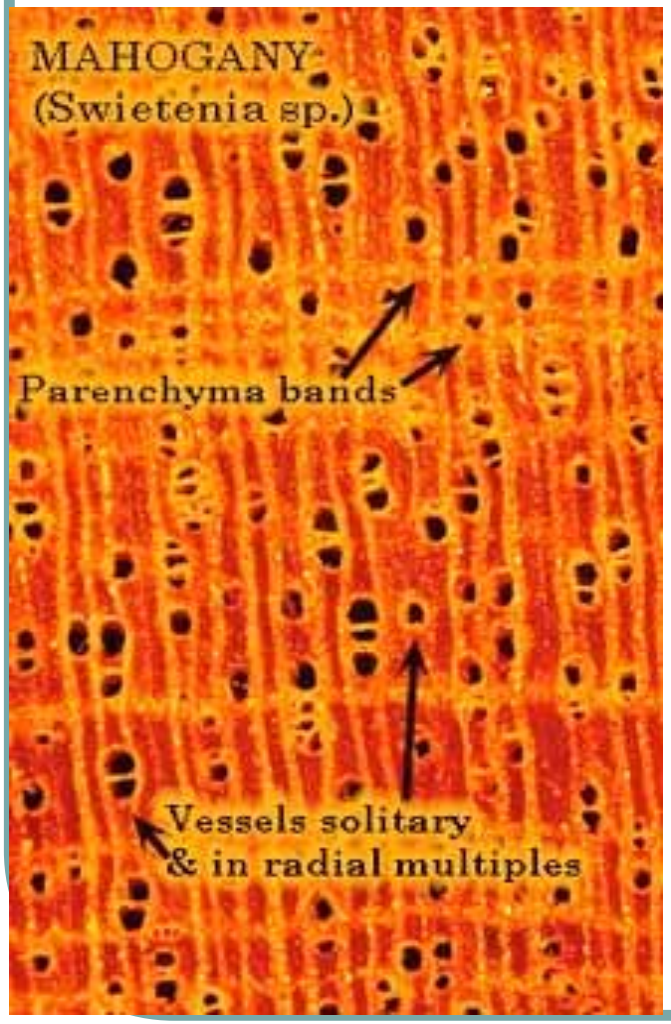


Ring Porous

Black Oak
Railroad Point - North Haven

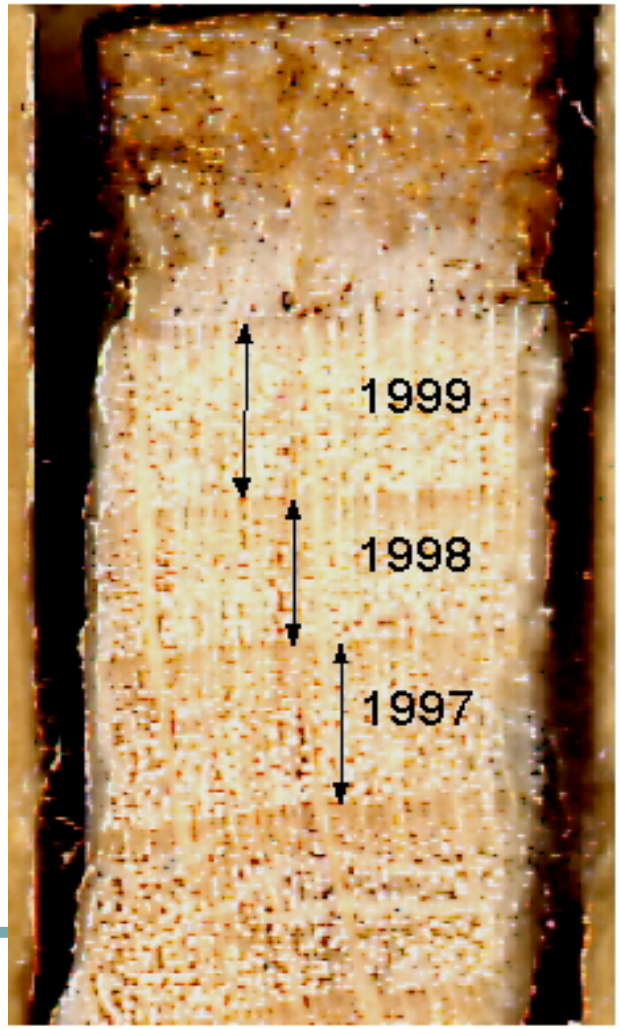


Diffuse Porous



American beech
Hubbard Brook, NH

Close-up



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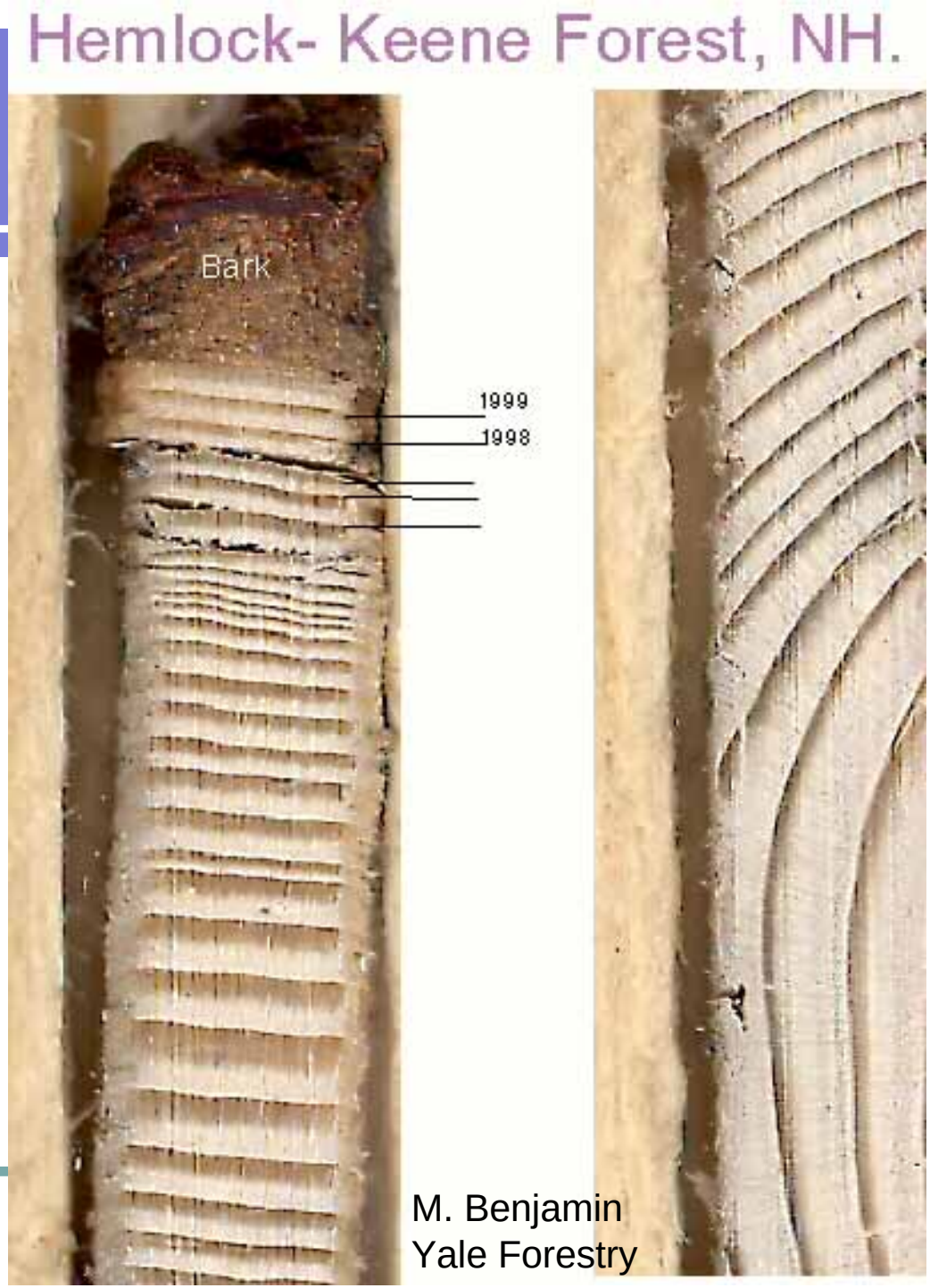
Non-Porous

Conifers have non-porous sapwood



Common Ring Porous Species

Oaks
Hickories
Elms
Ashes

Hackberry
Black locust
Sassafras
Mulberry

For more information:
http://www.woodanatomy.ch/species_dico.php