Tree Disease Identification
Stem and Branch 2:
Vascular wilts, Stem rusts, and others

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Stem and branch diseases 2

- Vascular wilts
- Shoot blight
- Stem rusts
- Abiotic “cankers”
- Stem decays

Vectors

Insects can spread diseases from tree to tree. Some examples:

- Sucking insects – viruses, bacteria
- Wood boring beetles – vascular wilt fungi, nematodes

Vascular wilts

Symptoms:

Branch flagging in crown

Wilting

Discoloration in sapwood

Maple trunk section with outer tissue cut away to reveal characteristic olive green color of Verticillium-infected xylem.

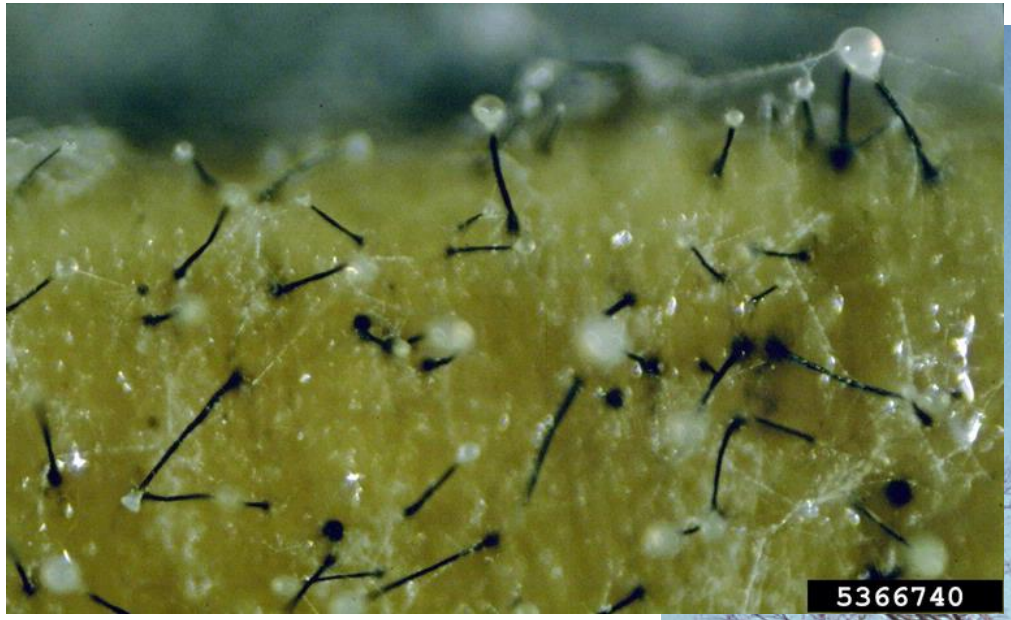
Paul Bachi, University of Kentucky Research & Education Center, www.forestryimages.org

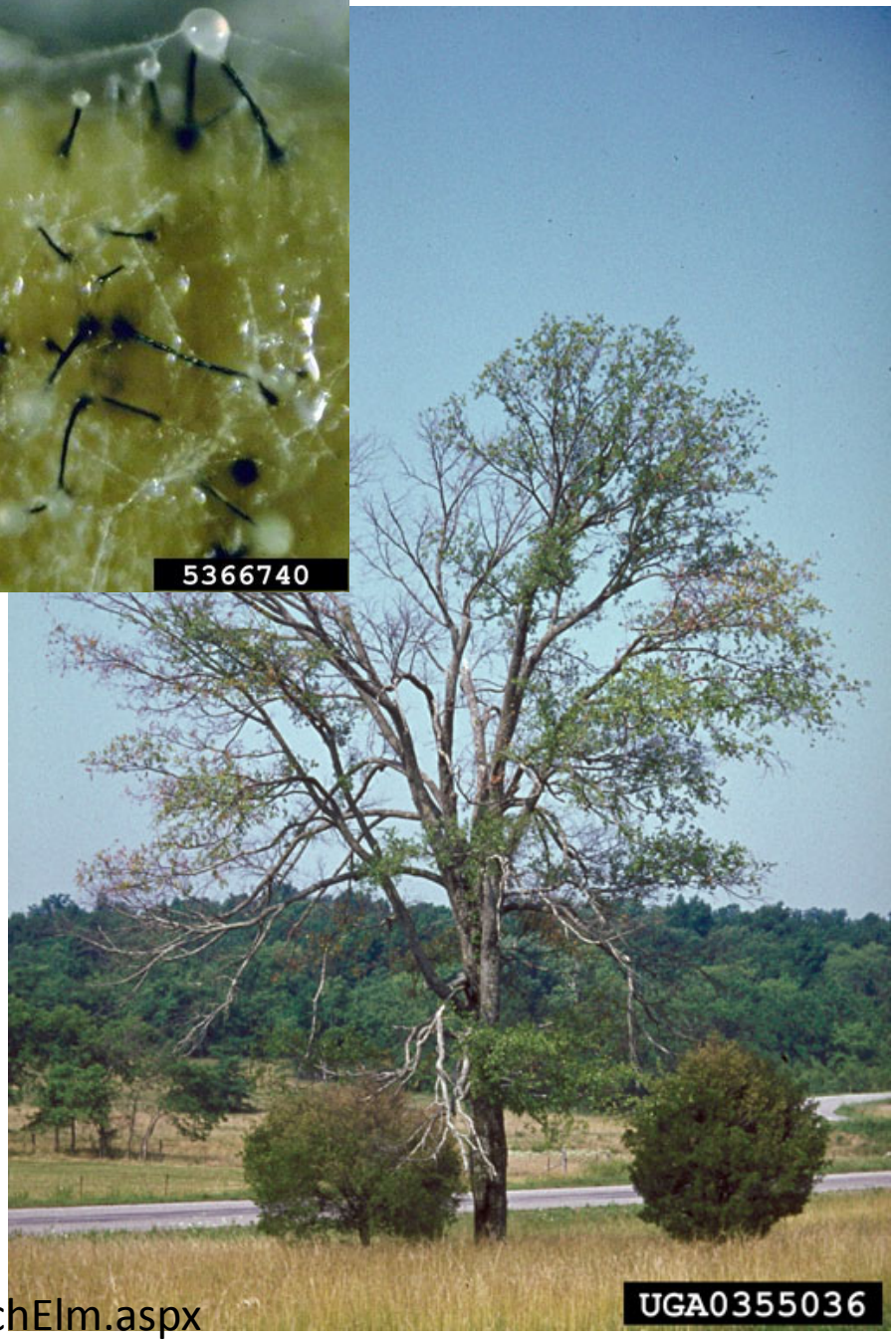
Advanced crown symptoms of Dutch elm disease

Steven Katovich, USDA Forest Service

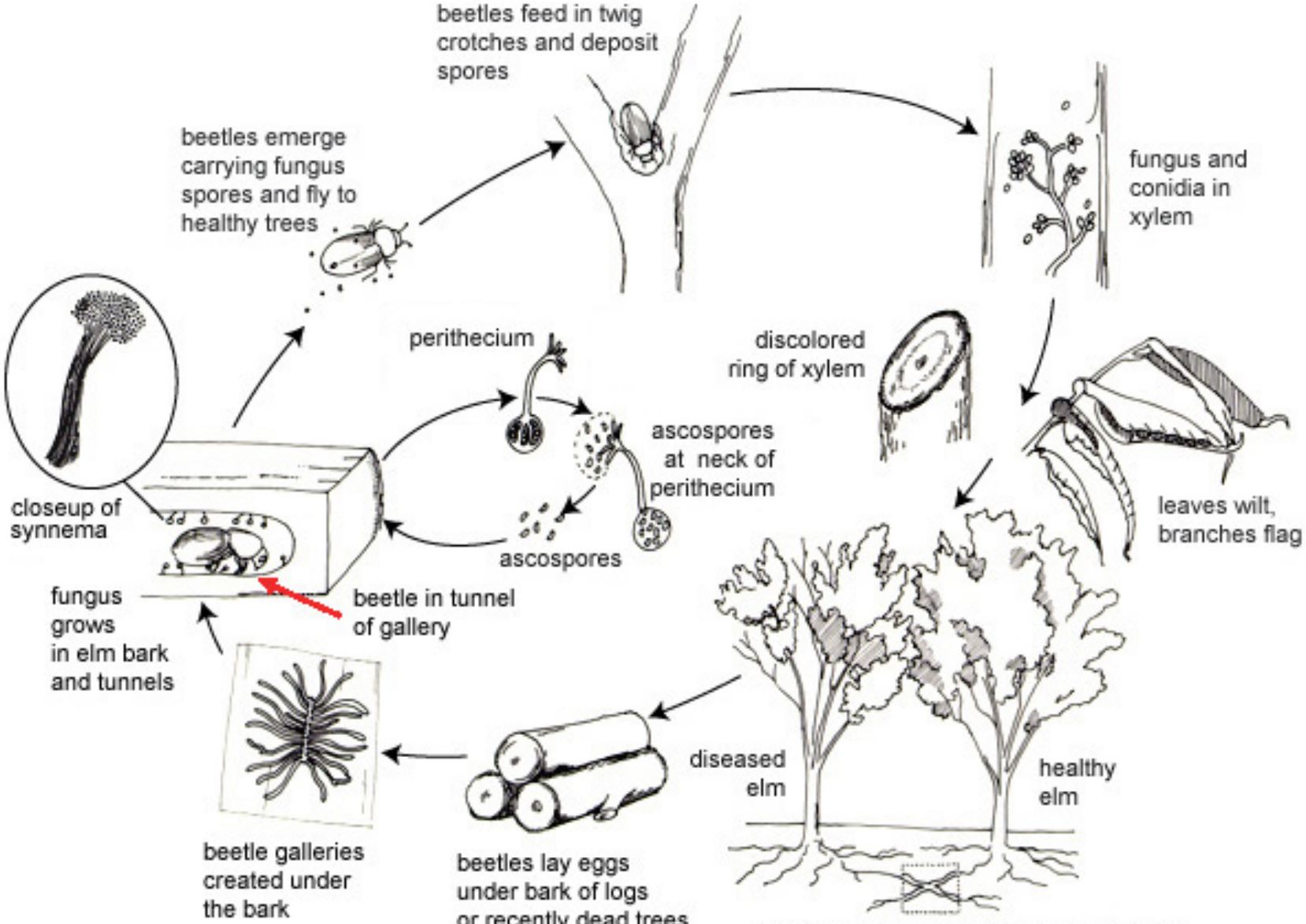
Dutch elm disease

- Hosts – *Ulmus* spp.
- Pathogens – *Ophiostoma ulmi, O. novo-ulmi*
- Vectors – *Scolytis multistriatus*, *Hylurgopinus rufipes*

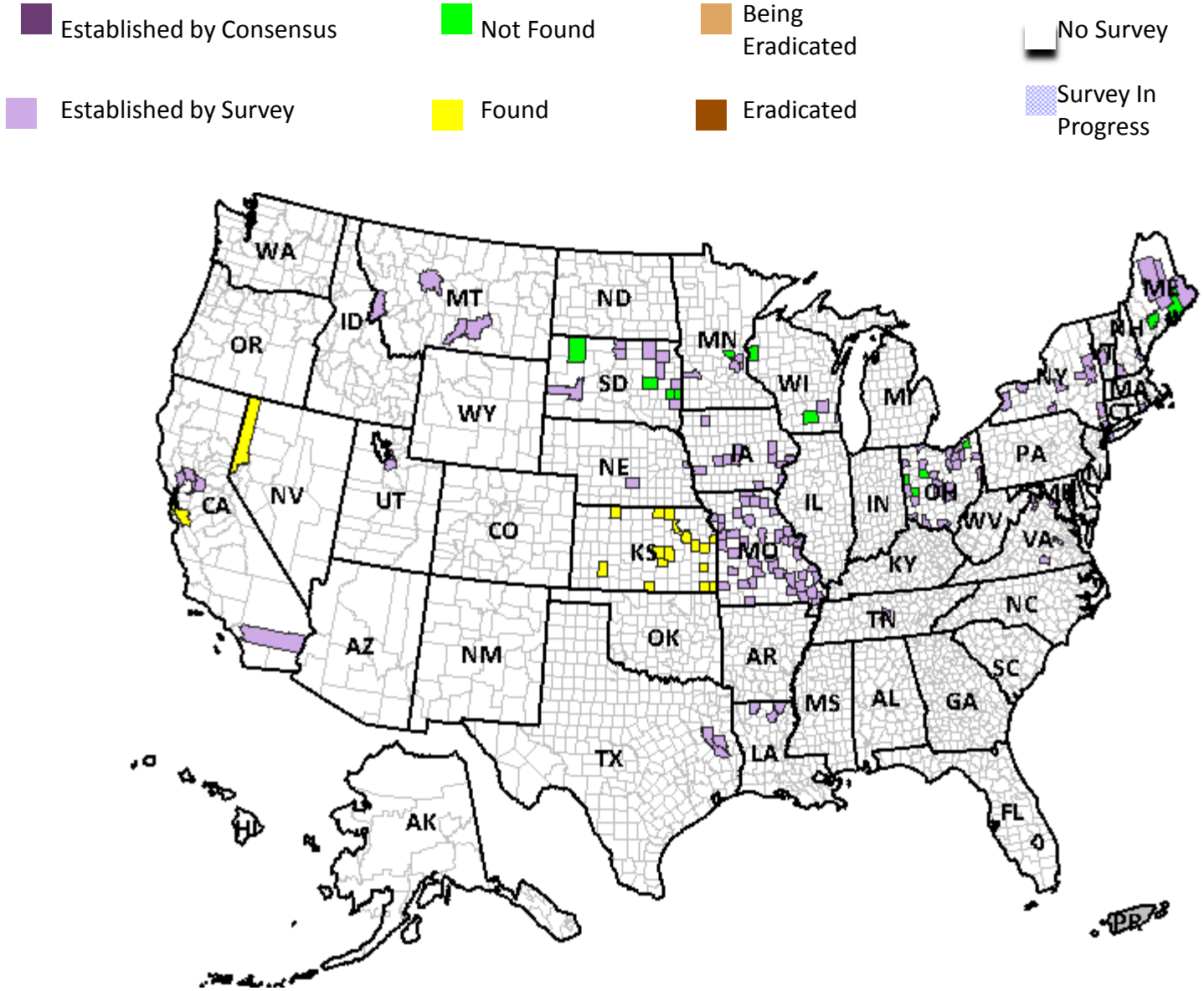




http://www.apsnet.org/edcenter/intropp/lessons/fungi/ascomycetes/Pages/DutchElm.aspx



Drawing courtesy Vickie Brewster



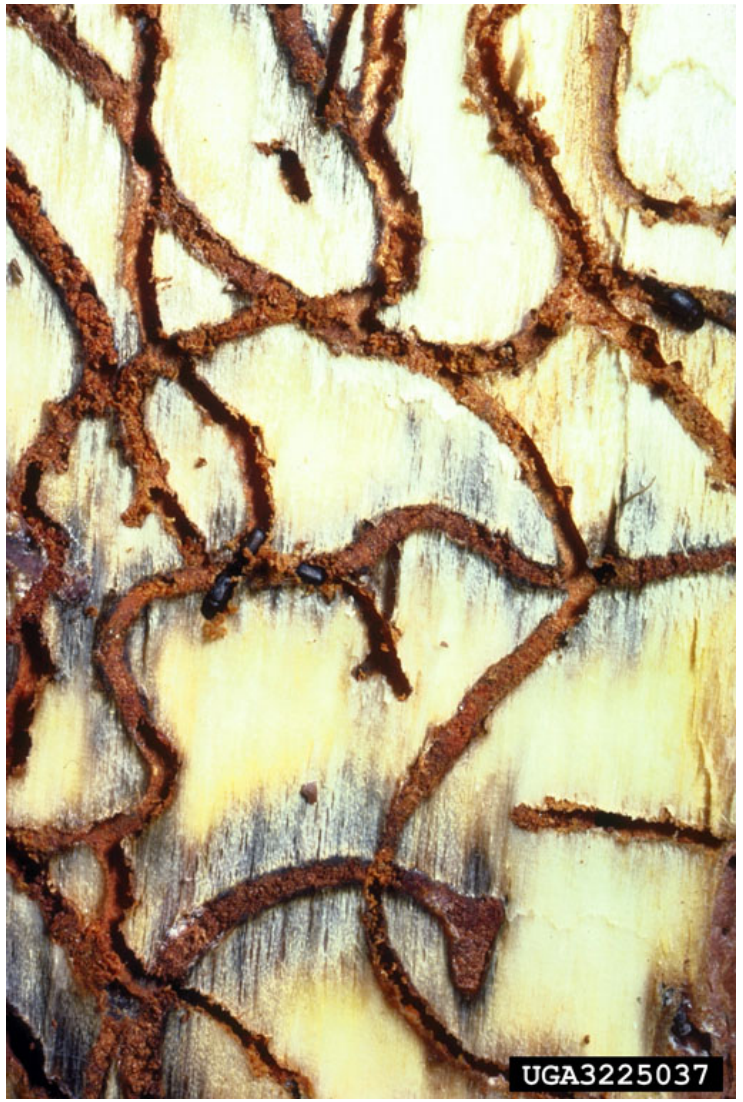
Dutch Elm Disease in the US

DED found in Seattle in 2001

National Agricultural Pest Information System (NAPIS). Purdue University. "Survey Status of Dutch Elm Disease - *Ophiostoma ulmi* (All Years)." Published: 03/24/2015. http://pest.ceris.purdue.edu/map.php?code=FGAGCHF&year=alltime. Accessed: 03/24/2015.

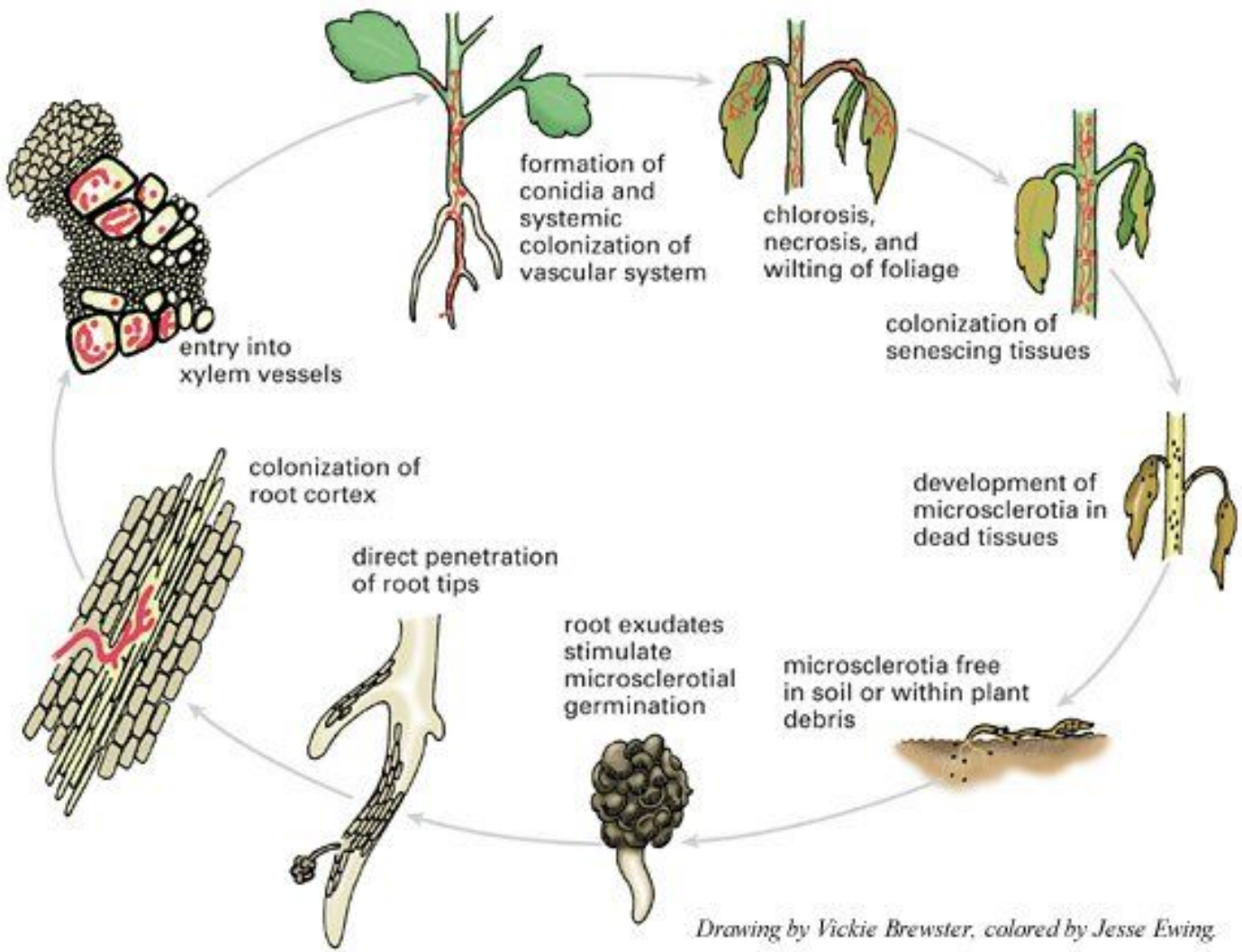
Bluestain fungi

- Hosts - conifers
- Pathogens – *Ophiostoma* spp., *Ceratocystis* spp.
- Vectors – bark beetles



Verticillium wilt

- Hosts – many, including *Acer, Prunus, Malus, Rhododendron*
- Pathogens – *Verticillium dahliae, V. albo-atrum*



Symptoms of *Verticillium* wilt

Premature fall color, branch flagging

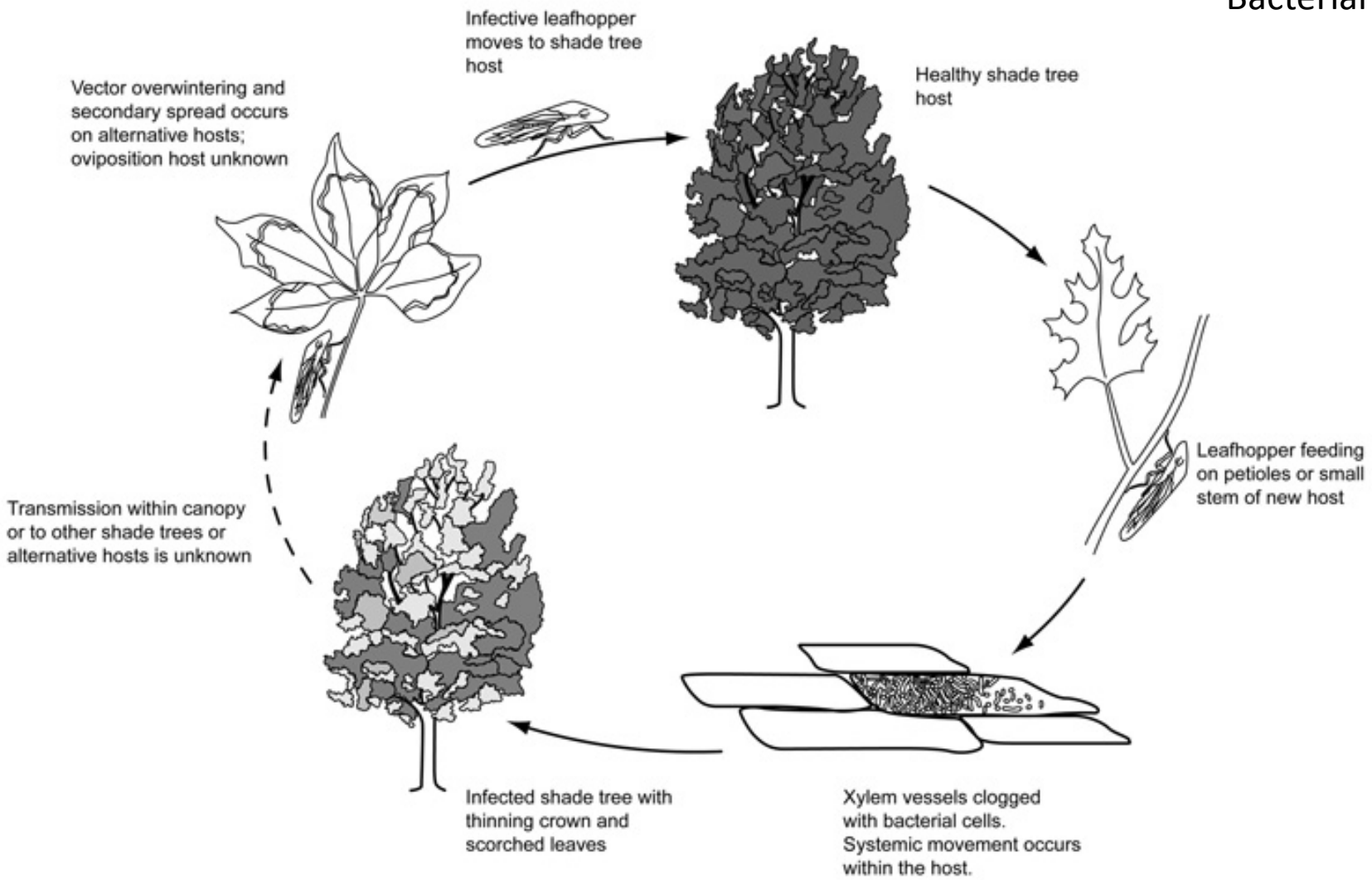
Vascular discoloration

Bacterial leaf scorch

- Hosts – Maple, elm, oak, many other hardwood tree species
- Alternate hosts - many
- Pathogen – Xylella fastidiosa
- Vectors – leafhoppers (family Cicadellidae) and spittlebugs (family Cercopidae)
- Range – California, SE United States, New Jersey

http://www.apsnet.org/edcenter/intropp/lessons/prokaryotes/Pages/BacterialLeafScorch.aspx

Bacterial leaf scorch



Bacterial leaf scorch

Marginal necrosis from drought stress and high temperatures

Managing wilt diseases

- Control insect vectors
- Preventative fungicide injections
- Sanitation
- Re-plant with resistant species

Shoot blight

Botryosphaeria shoot blight on Rhododendron

Fungi and/or bacteria infect flowers, leaf buds

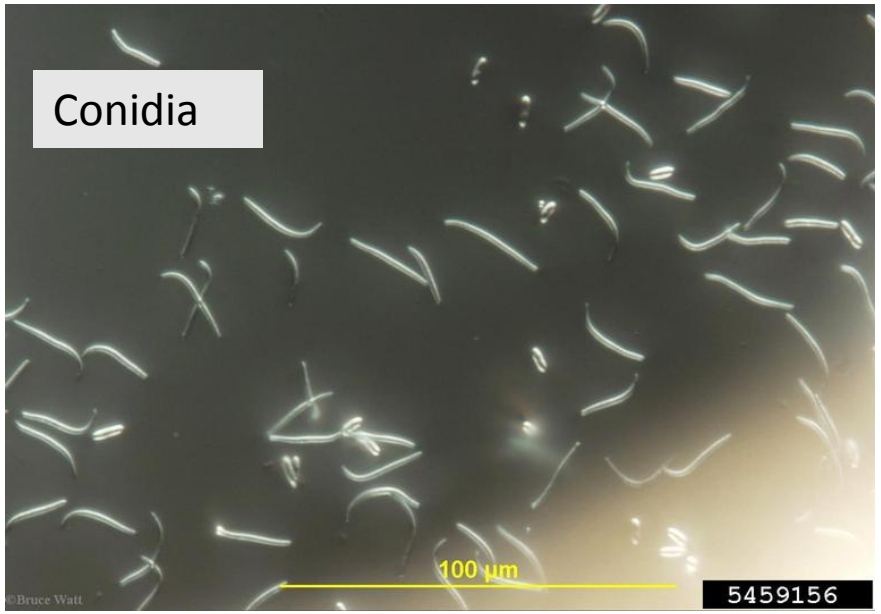
Move down shoot and girdle or cause cankers

Overwinter in attached fruit or dead leaves

Phomopsis shoot blight and canker

<u>Conifers</u>

- Juniper (*Phomopsis juniperovora*)
- Douglas-fir (*Phomopsis lokoyea*, sexual stage *Diaporthe lokoyae*)



Tip dieback on juniper caused by *Phomopsis juniperivora*

Phomopsis blight

<u>Broadleaf</u>

- *Vaccinium* spp. (*Allantophomopsis lycopodina, Phomopsis columnaris, P. vaccinii*)
- Madrone (*P. vaccinii*)
- Oregon grape
- Salal

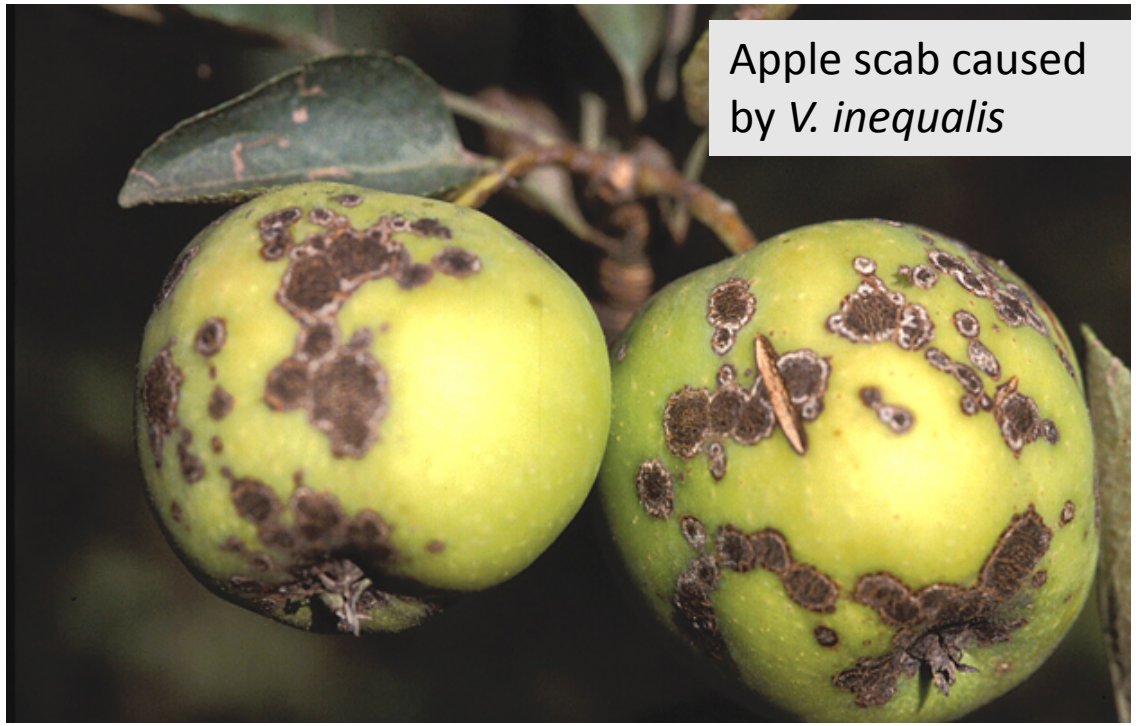
Diplodia tip blight

- Hosts – Pines
- Pathogen – *Diplodia pinea* (aka *Sphaeropsis sapinea*)

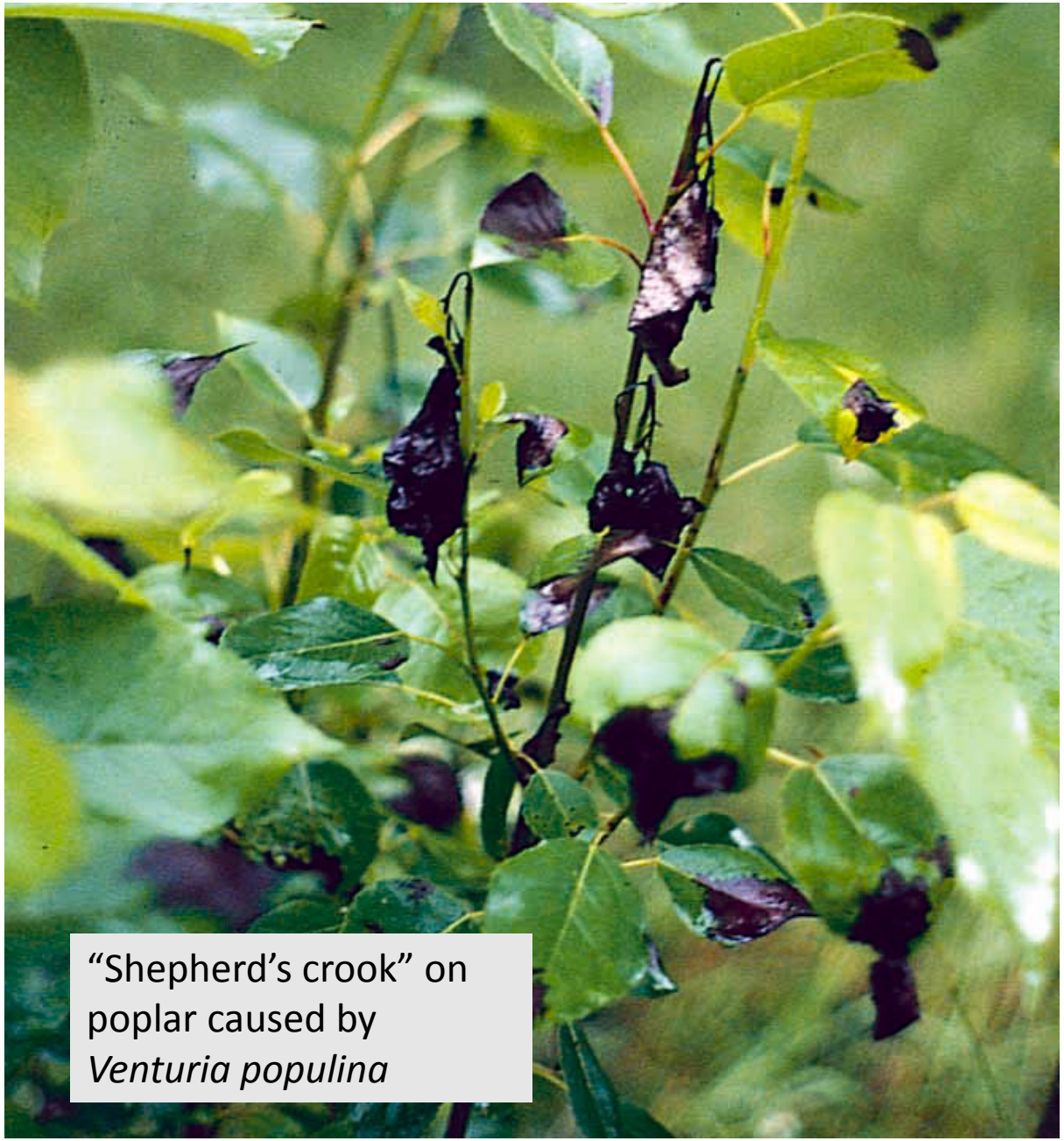
A problem on stressed trees. Infections can be latent until stress occurs.

Venturia shoot blight

- Hosts: willow, poplar, rhododendron, Pathogens: *Venturia* spp.
- Also causes scab on fruit (*Malus, Pyrus, Pyracantha, Sorbus,* etc)



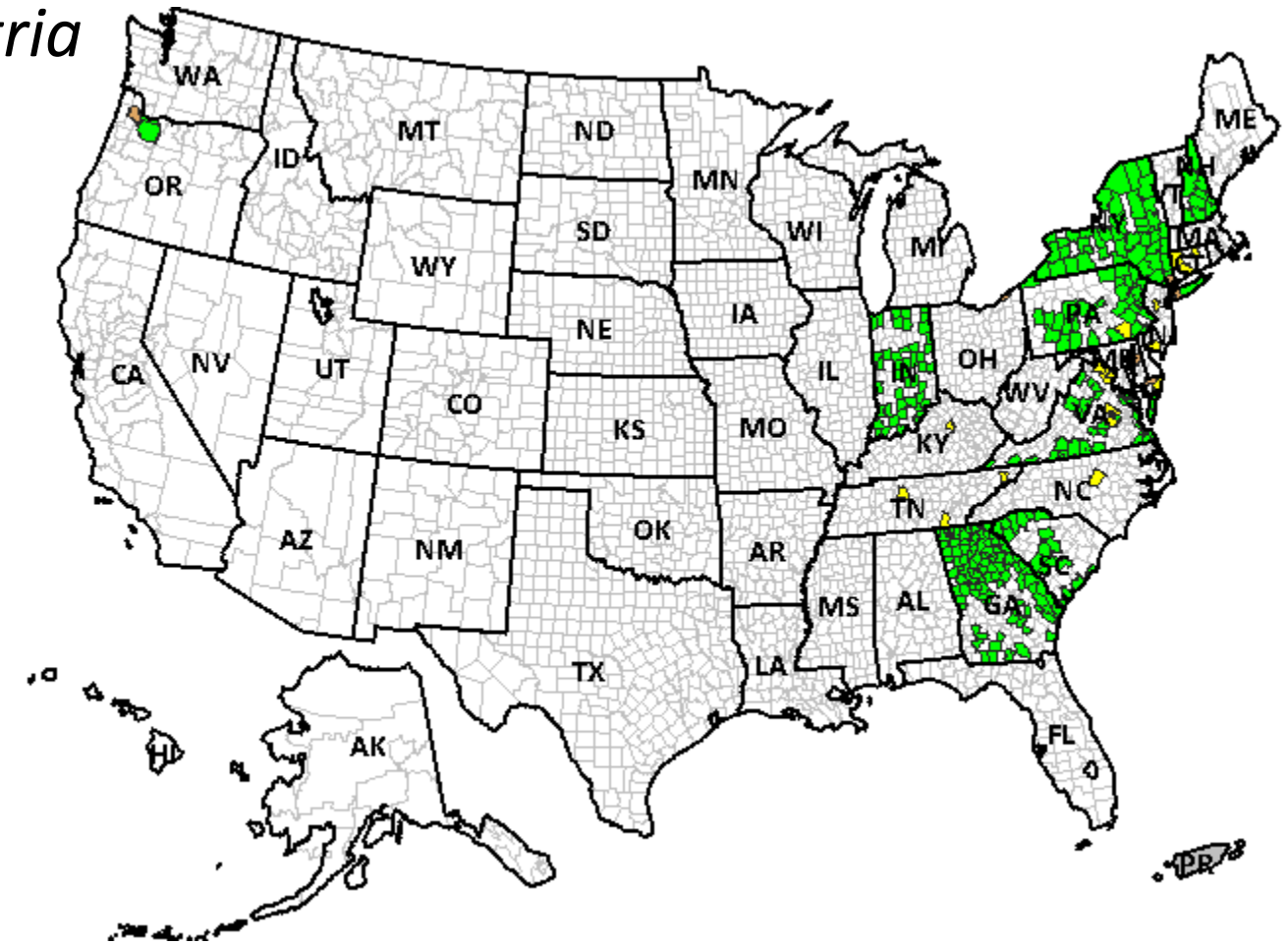
Apple scab caused by *V. inequalis*



"Shepherd's crook" on poplar caused by *Venturia populina*

Boxwood blight

- Host – Boxwood (*Buxus* spp.)
- Pathogen – *Cylindrocladium buxicola* (sexual stage: *Calonectria pseudonaviculata*)

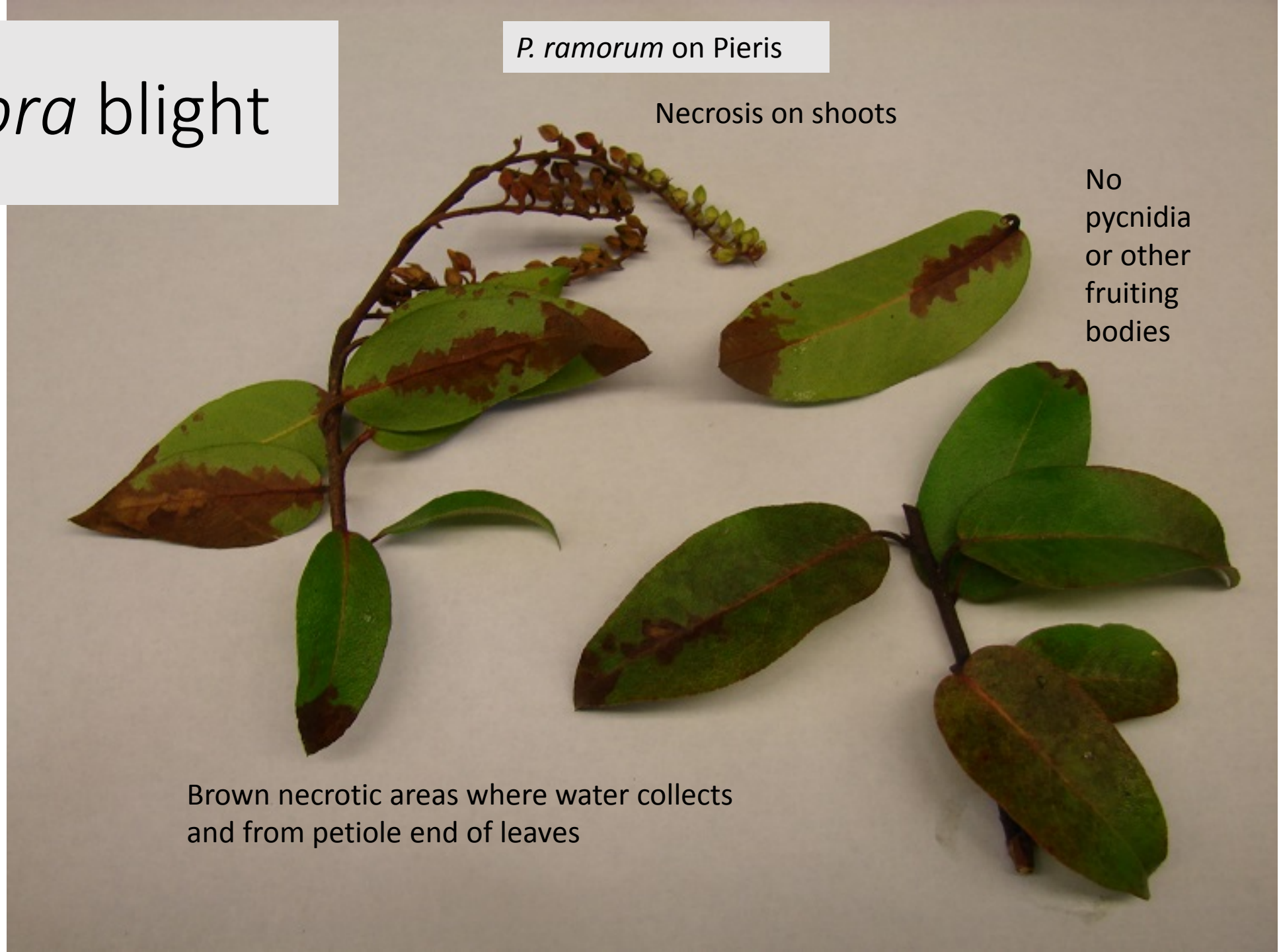


Volutella and Macrophomina blight – leaves do not defoliate

Phytophthora blight

P. citricola/plurivora
P. cactorum
P. syringae
P. chlamydospora
P. ilicis
P. ramorum
P. kernoviae

others



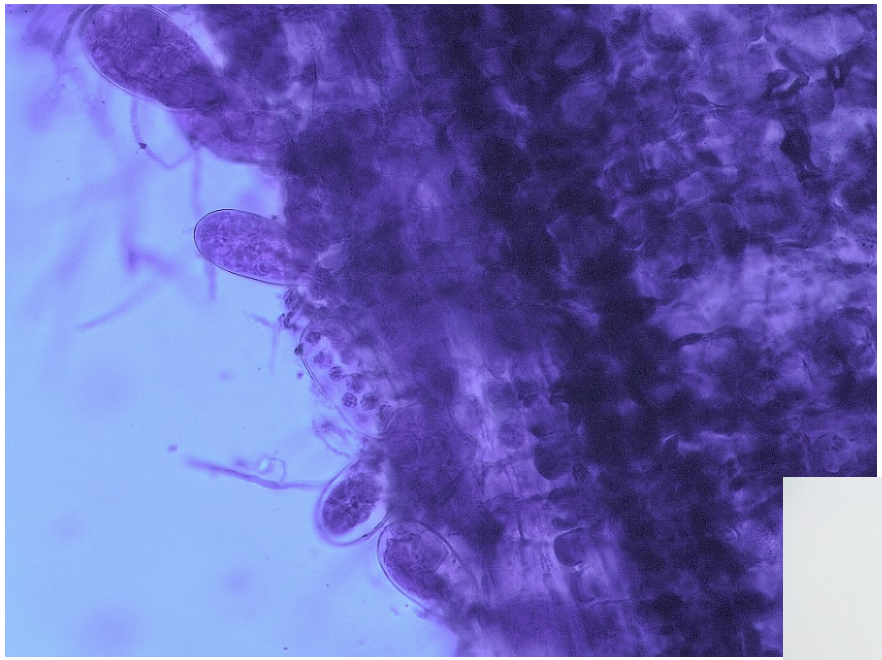
Ramorum blight

More than 100 hosts

Grand fir (*Abies grandis*)

Rhododendron

P. ramorum on Western larch



Massive sporangia production on needles

Canker w/ brown staining under bark

Wilting and discoloration

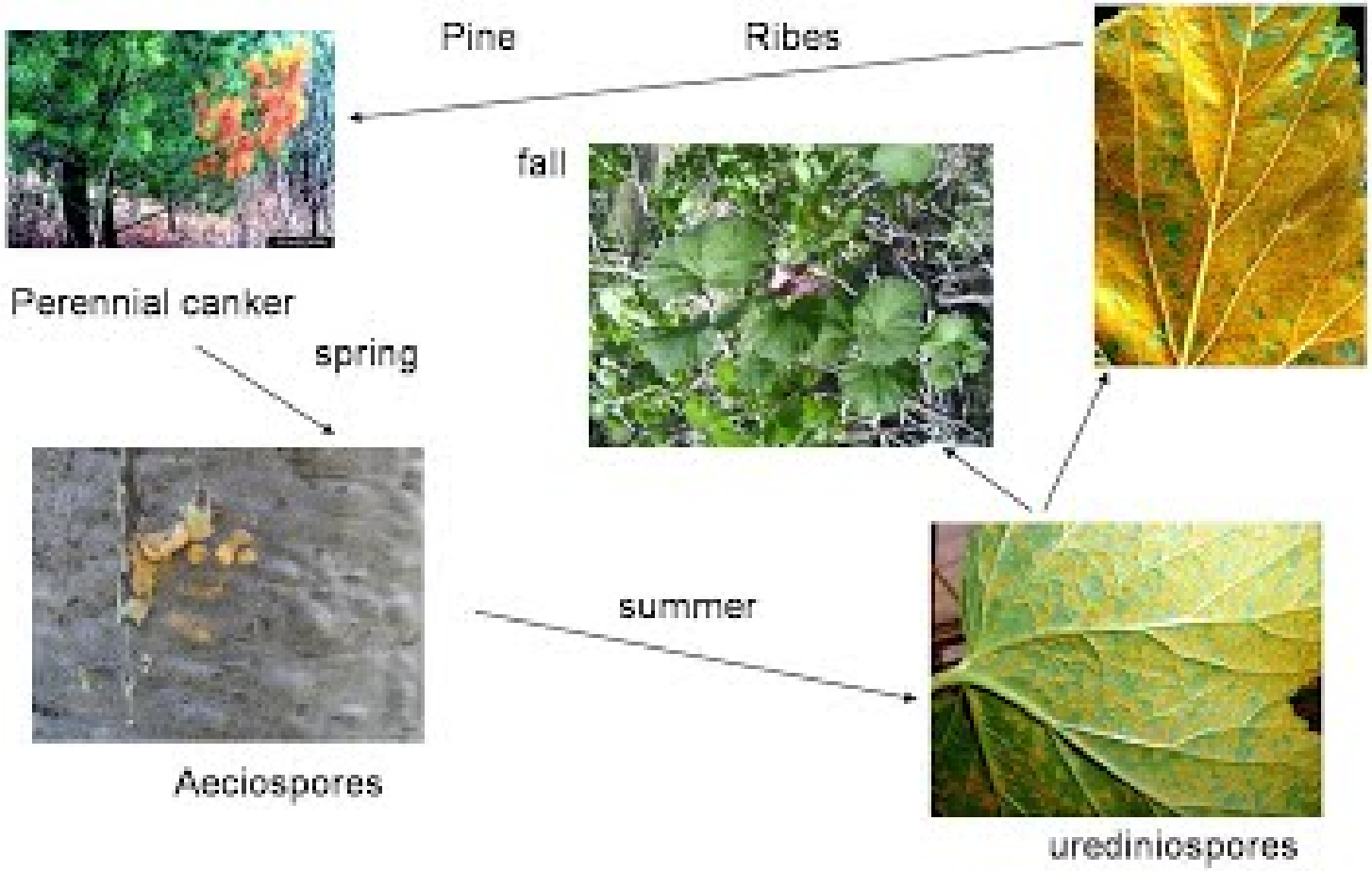
Stem Rusts

- Complex life cycle with several spore stages on different hosts
- Airborne
- Host-specific
- Obligate parasites – cannot be cultured

White pine blister rust

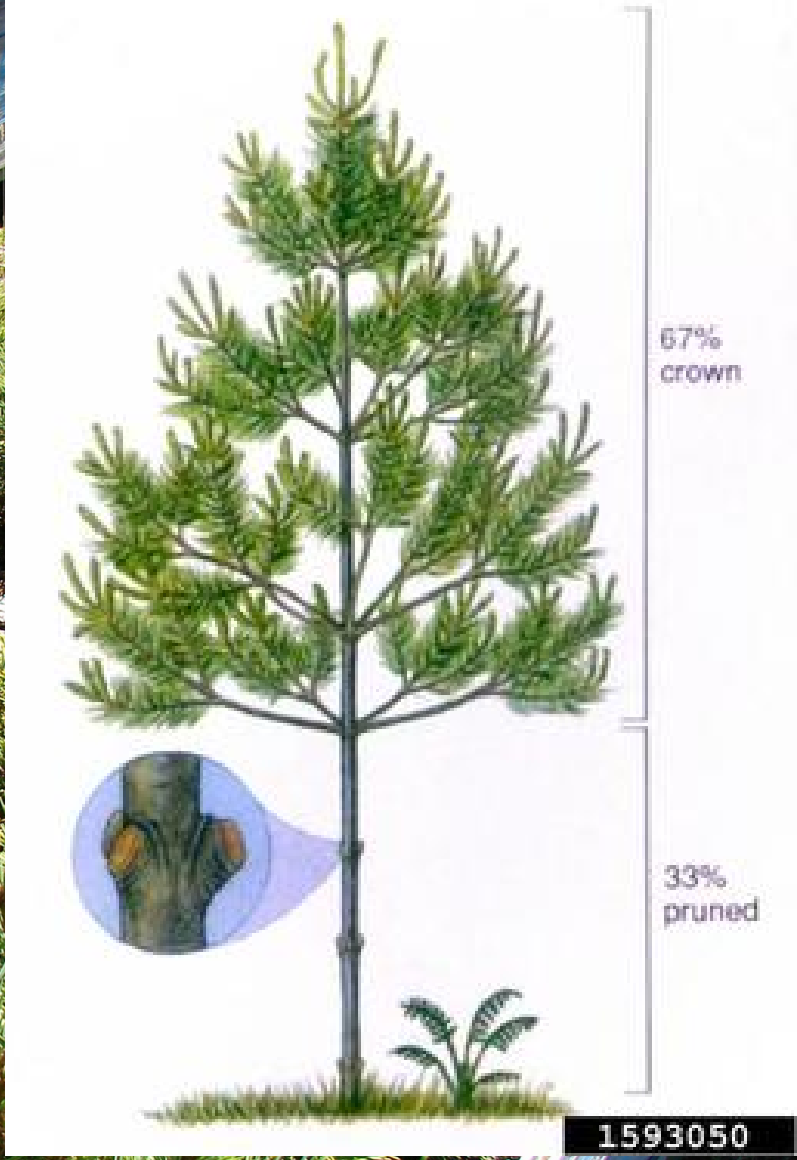
- Hosts – 5 needle or white pines (western white pine, eastern white pine, whitebark pine, limber pine, sugar pine, etc.)
- Alternate hosts – *Ribes* spp.
- Pathogen – *Cronartium ribicola*

WPBR life cycle



Managing WPBR

- Pruning
- Reduce humidity
- Plant resistant genotypes
- Alternate host removal not very effective



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Comandra rust

- Hosts – Lodgepole pine, Ponderosa pine
- Alternate hosts – comandra or bastard toadflax (*Comandra umbellata*)
- Pathogen – *Cronartium comandrae*

Western gall rust

- Hosts – Two needle pines (Ponderosa, Shore, Lodgepole, Scots)
- Pathogen – *Peridermium harknessii* (sexual stage *Endocronartium harknessii*)

Western gall rust on pine

Abiotic canker symptoms

Sunscald is seen on the south side of thin barked trees

Poor quality landscape tree with a frost crack.

Hail damage on twigs

Mechanical damage

This tree has a chestnut blight canker that formed after the name was carved in the trunk.

Parking lot damage

Mechanical damage from frisbee golf

Stem decays

- Basidiomycete fungi
- Enter through wounds, branch stubs, and cankers
- Large fruiting bodies

Advanced decay

White rot: Cellulose and lignin decayed, stringy or spongy

Brown rot: Cellulose decayed, leaving lignin, usually cubical

White rots

Ganoderma applanatum – the “artists conk”

Trametes versicolor – “Turkey tail”

Brown rots

Fomitopsis pinicola – “red belt fungus”

Phaeolus schweinitzii – “velvet-top fungus”, “cow pie fungus”, “dyer’s polypore”