



Invasive Bark and Ambrosia Beetles

**James R. LaBonte
Oregon Department of Agriculture
Chemical Applicator's Short Course
Wilsonville, OR
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Lifestyles of Bark and Ambrosia Beetles

Bark beetles



Ambrosia beetles

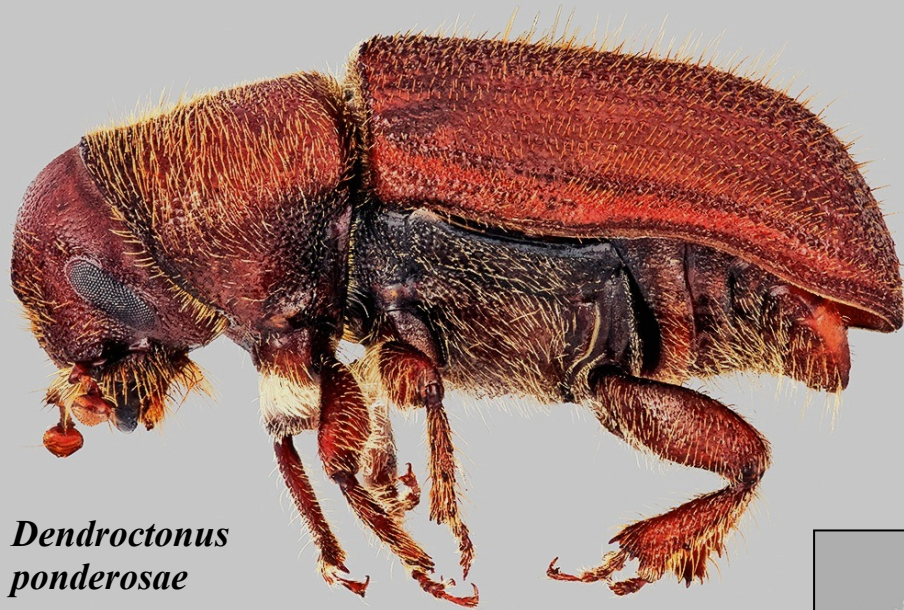


Seed-eaters



Bark Beetles

- Galleries under bark
- Eat wood tissue + fungi
- Often limited hosts
- Some kill hosts
- Use pheromones



Dendroctonus ponderosae



Ips pini

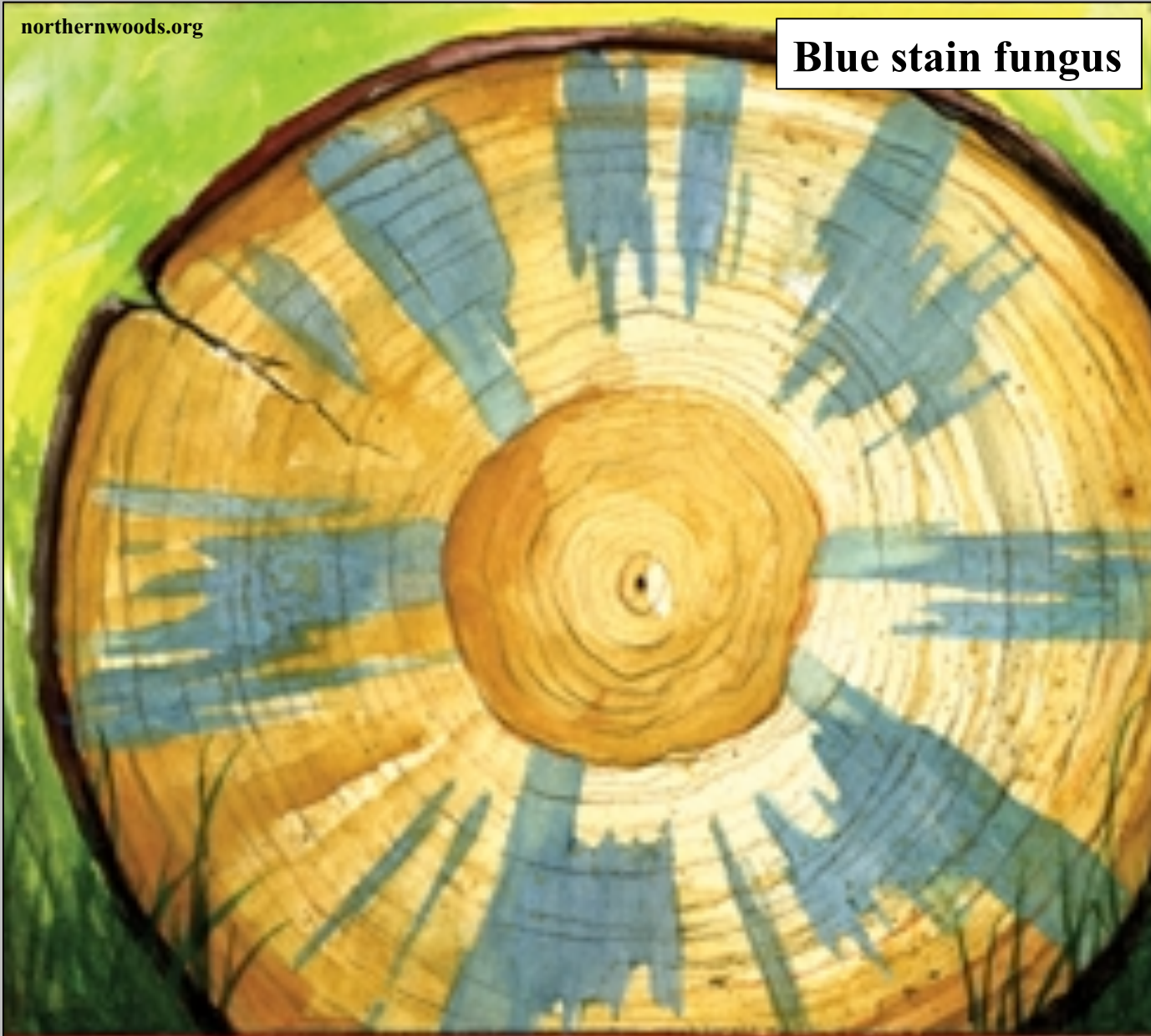


UGA3066084

Mutualisms with Fungi

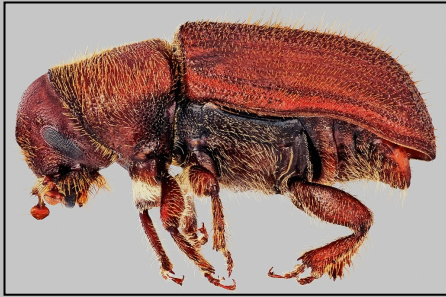
northernwoods.org

Blue stain fungus



Bark Beetles

Dendroctonus



Hylesinus



Orthotomicus



Pityophthorus



Pseudohylesinus



Dryocoetes



Hylurgops



Phloeosinus



Scolytus



Hylastes



Pityogenes

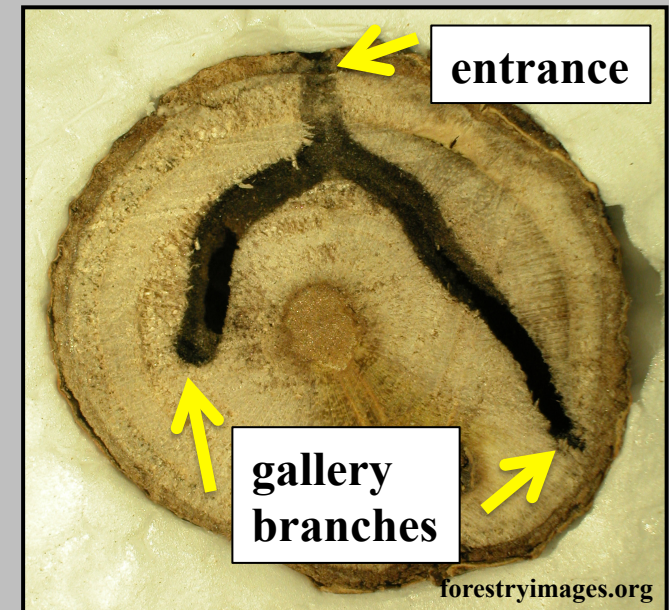
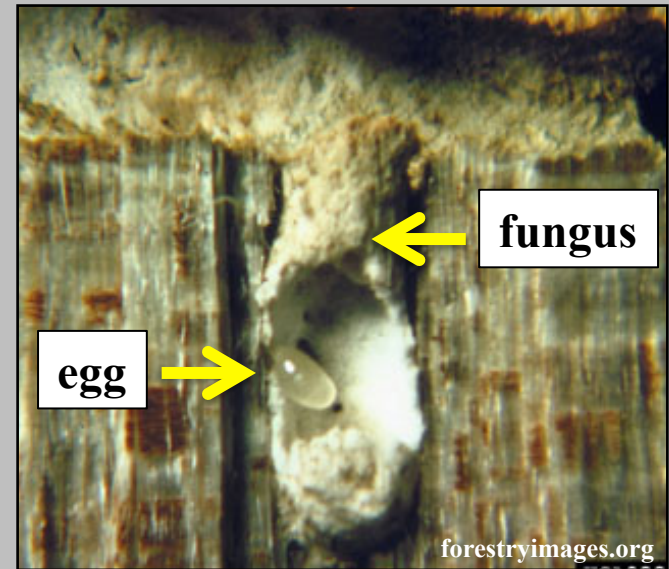


Ips



Ambrosia Beetles

- Galleries direct into sapwood & heartwood
- Eat “ambrosial” fungi
- Often 100’s of hosts, including raw wood
- Some kill hosts
- Relatively few use pheromones
- Many species
- Formerly regarded as “non-actionable” by USDA



Ambrosia Beetles

Anisandrus



Xyleborinus



Gnathotrichus



Trypodendron



Cyclorhipidion



Xyleborus



Monarthrum



Xyloterinus



Euwallacea



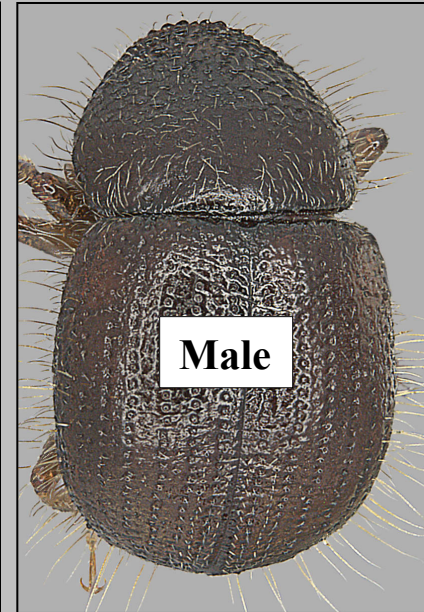
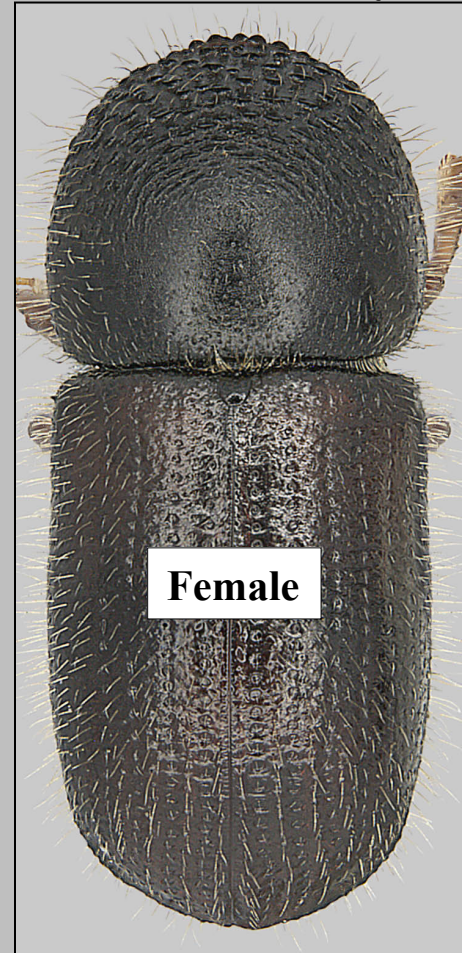
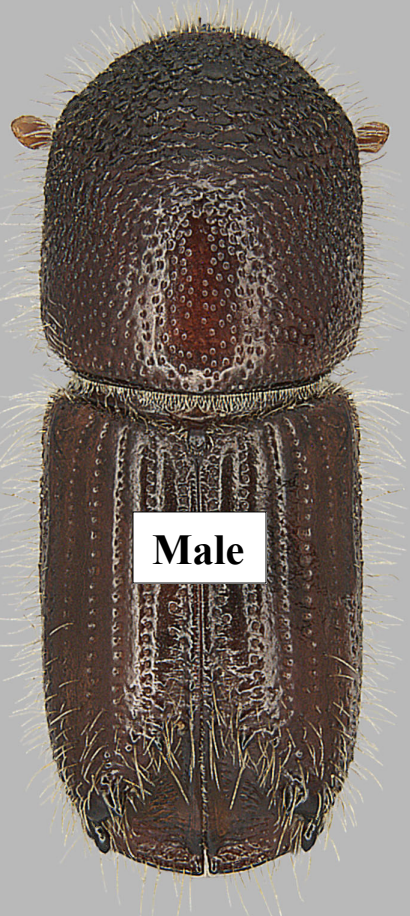
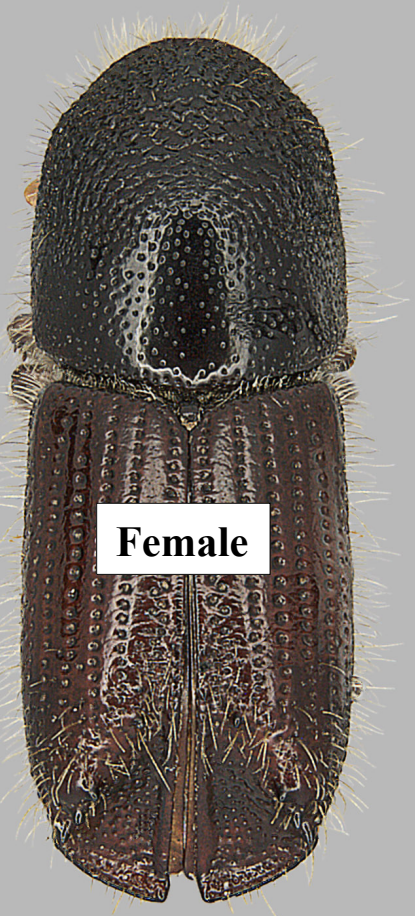
Xylosandrus



Mating systems

Bark Beetles: Normal bisexuality – females and males similar in size, appearance, and flight capability

Most **Ambrosia Beetles:** Facultative parthenogenesis & sibling mating – males dwarfed, flightless, with reduced or no eyes



**So far, Bark Beetles
Cause the Greatest
Damage in Oregon
(this may change)**

Walnut Twig Beetle: *Pityophthorus juglandis*

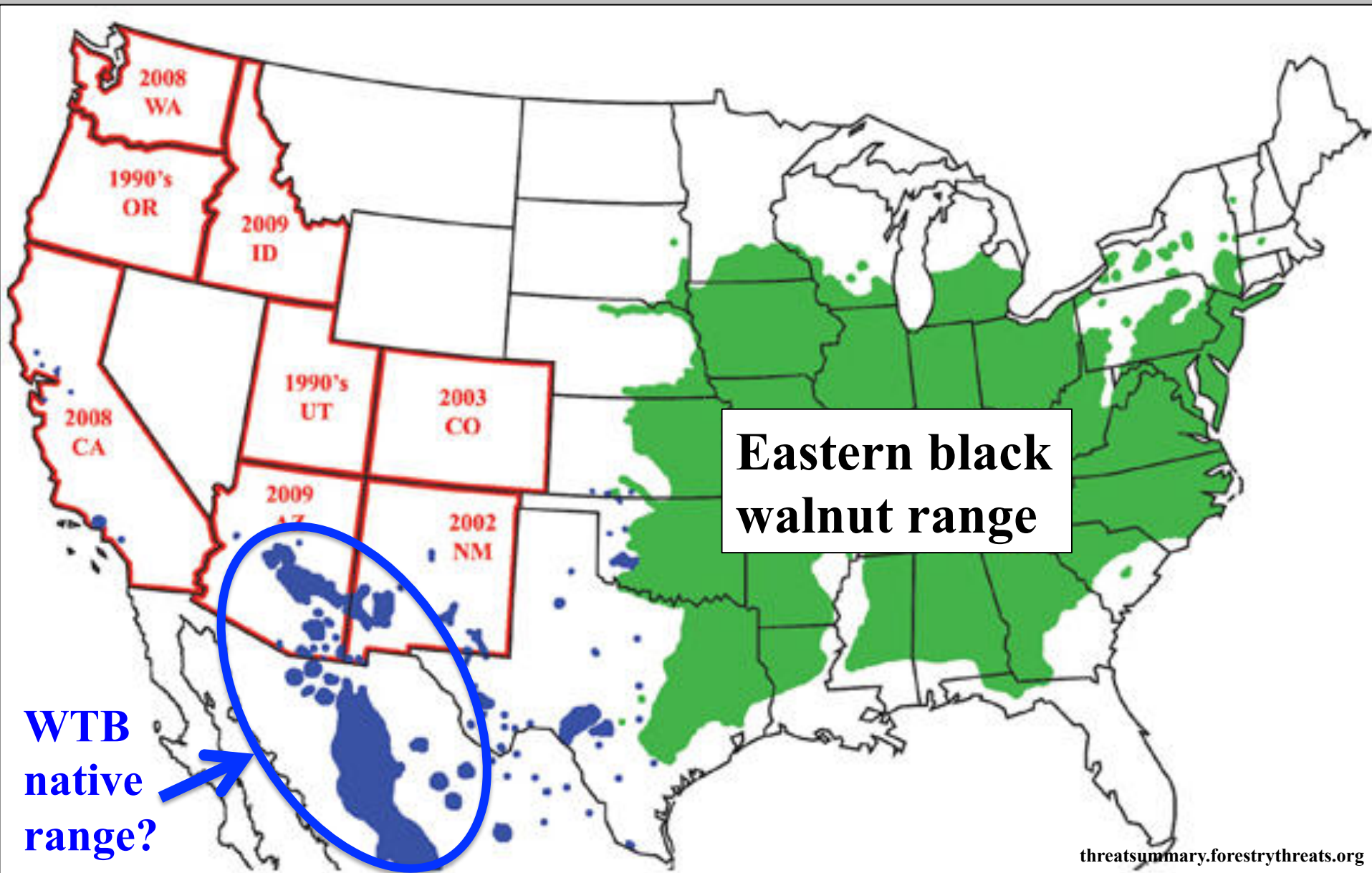
- Regional exotic
- Insignificant itself
- Vector of lethal pathogen
Thousand Cankers Disease



**How Do You
Know
It Is WTB?**



Distribution of WTB/TCD



Thousand Cankers Disease



Thousand Cankers Disease



UGA5024087

Smaller European Elm Bark Beetle

Scolytus multistriatus

- Vector of Dutch elm disease
- Elms only
- Eurasian
- Poor competitor with *S. schevyrewi*

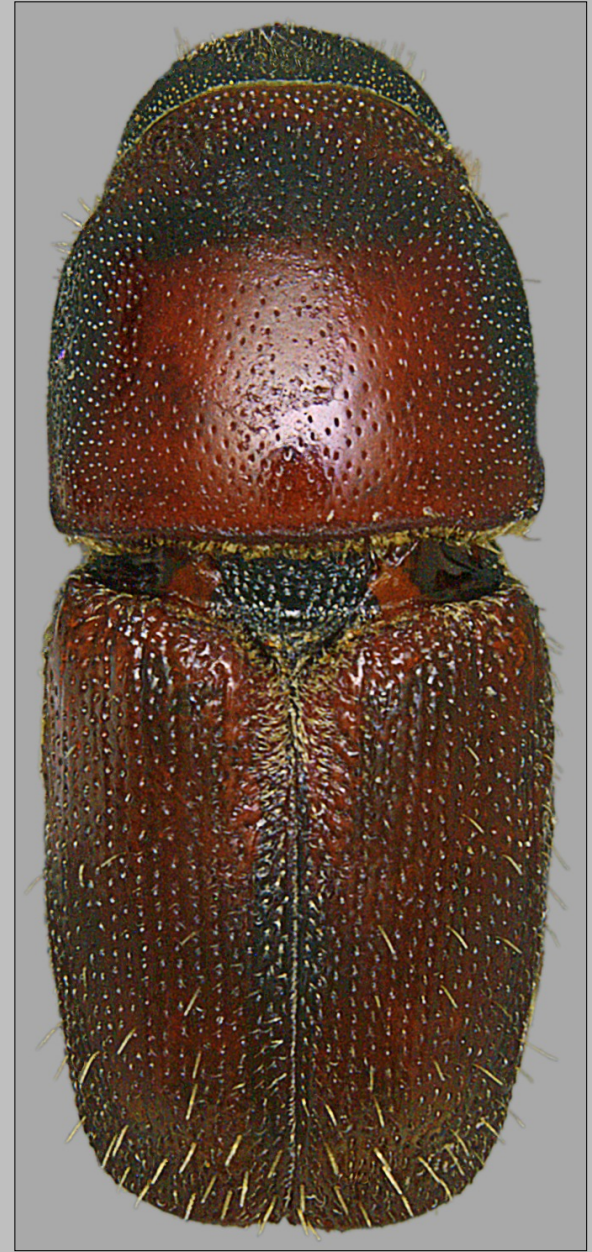
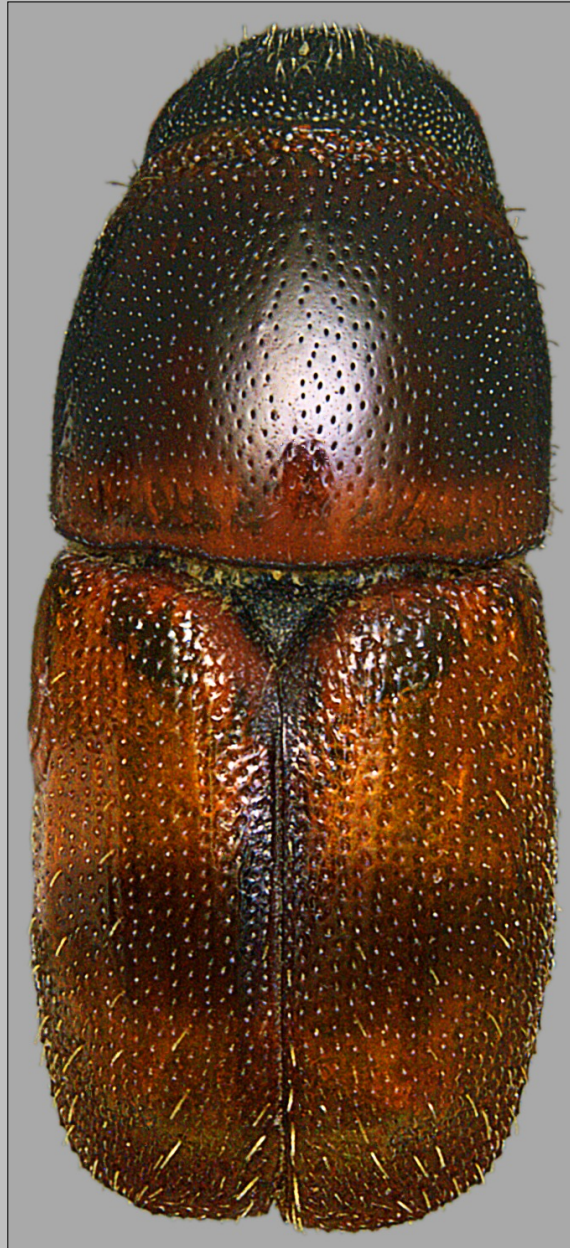


Banded elm bark beetle: *Scolytus schevyrewi*

- “New kid on the block” (2003)
- Vector of Dutch elm disease
- Can kill tree without Ded
- Displaces *S. multistriatus*
- Asian



Banded Elm Bark Beetle



Both Elm Bark Beetles



Shothole Borer: *Scolytus rugulosus*

- Africa, Asia, Europe, Middle East
- Many deciduous trees, especially fruit trees and rosaceous shrubs
- Normally secondary pest in stressed hosts



Hylastes opacus

- **Not yet known to be harmful**
- **European**
- **Pines**



100%

Percentage of Individuals Trapped

Xyleborinus saxesenii



*Anisandrus
dispar*



More exotic
ambrosia beetles
than anything
else!

Everything else! →

Scolytidae from Oregon Exotic Woodborer Surveys 1997-2003

<u>Species</u>	<u>Number</u>	<u>Percentage</u>
<i>Xyleborinus saxesenii</i>	74,984	66.8
<i>Anisandrus dispar</i>	9,013	8.0
<i>Hylastes nigrinus</i>	5,871	5.2
<i>Gnathotrichus sulcatus</i>	4,120	3.7
<i>Hylurgops porosus</i>	3,858	3.4
<i>Ips latidens</i>	2,042	1.8
<i>Pityophthorus</i> spp.	1,379	1.2
<i>Dendroctonus valens</i>	1,356	1.2
<i>Gnathotrichus retusus</i>	1,265	1.1
<i>Pseudips mexicanus</i>	1,071	0.95
Other species	7,278	6.5
TOTAL	112,237	

Pear Blight Borer: *Anisandrus dispar*

- Eurasia – in OR over 100 years
- Broad-leaved hosts, esp. fruit trees
- Stressed (recently planted, water-logged)
- Problem for chestnut plantings in OR



Lesser shothole borer: *Xyleborinus saxesenii*

- Eurasia – in OR over 100 years (beer casks?)
- 100's of broad-leaved and coniferous hosts
- Nursery & ornamental hosts
- Especially stressed (recently planted, water-logged) hosts



Black stem borer: *Xylosandrus germanus*

- Asian – recent in OR (Portland area)
- Hundreds of hosts – esp. broad-leaved
- Can be primary pest of ornamentals and orchards (especially apples)
- Degrades fresh cut timber & raw lumber
- No reported damage in OR

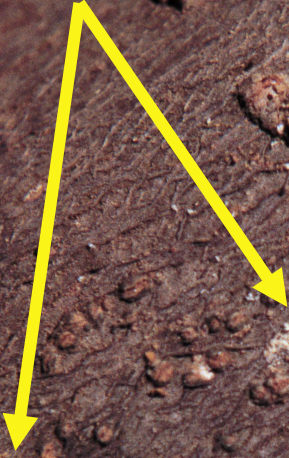


Xylosandrus compactus



Black Stem Borer

“Shot” holes



Photos courtesy of Jason Oliver
Tennessee State University



“Frass pencils” of
Xylosandrus spp.

Exotic Ambrosia Beetles in Oregon

Not Yet Known to be Harmful

Cyclorhipidion bodoanum



Xyleborus pfeili



Xyleborinus attenuatus



Xyleborus xylographus



Xyloterinus politus

(regional exotic)



Coming Attractions: Exotic Bark & Ambrosia Beetles Not Yet In Oregon

- **Over 70 species of exotic bark & ambrosia beetles in North America**
- **At least one species added each year**
- **Only 13 known from Oregon**
- **Hundreds of other species “offshore”**

This onslaught is unceasing

Granulate Ambrosia Beetle: *Xylosandrus crassiusculus*

- Asian
- In Southeast U.S. since 1970's
- Aggressive, primary pest
- 100's of hosts (broad-leaves & conifers)
- Becoming major orchard, ornamental pest in SE
- Attacks raw lumber*
- In OR several times – eradicated in The Dalles



Mediterranean pine engraver: *Orthotomicus erosus*

- Eurasia, Middle East
- Originally California, now in Nevada also
- Pines, sometimes other conifers
- Stressed or recently dead hosts
- Firewood major pathway?



Polyphagous shothole borer: *Euwallacea fornicatus*

- Asian
- In California & Florida (different spp.?)
- Identity uncertain
- Many broad-leaved woody hosts
- Vector of *Fusarium* dieback



California avocado
attacked by *E. fornicatus*
vectoring *Fusarium* sp.



Fusarium dieback

Redbay ambrosia beetle: *Xyleborus glabratus*

- Asian – now in SE U.S.
- Attacks members of the laurel family (originally not problem – “only redbay”) Avocado!
- Vector of laurel wilt



**Redbay dying from laurel wilt vectored
by *X. glabratus* (lw also affects sassafras)**



Avocado dying from laurel wilt vectored by *X. glabratus*

redlandrambles.com

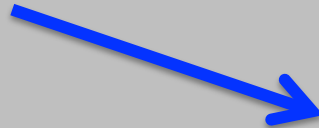


Big Problem

Lateral Transmission of Pathogens



**Fusarium
dieback**



Polyphagous shothole borer



**Laurel
wilt**



Redbay ambrosia beetle

Lesser shothole borer

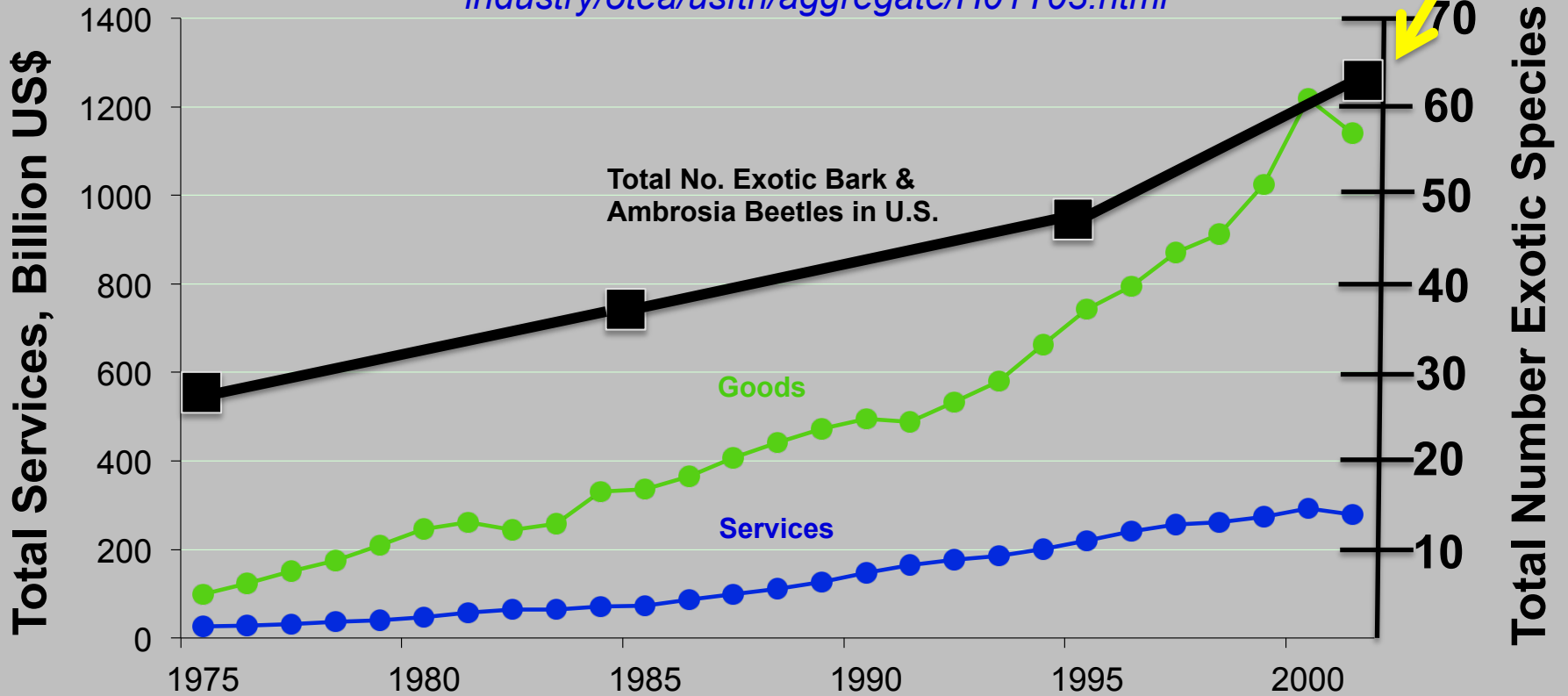


How Do They Get Here?

Global Trade

Total
now
over 70

US Imports, Total Goods and Services <http://www.ita.doc.gov/td/industry/otea/usfth/aggregate/H01T03.html>



USDA Bark & Ambrosia Beetle Interceptions (1985-2000)

49 Genera

> 68,000 specimens!

Solid Wood Packing Material #1



Bark Beetles in Bamboo Stakes from China

Courtesy Mark Hitchcox, USDA



Courtesy Mark Hitchcox, USDA



Hypothenemus n. sp.



Faux Christmas Trees from China

An Unidentified Chinese Cedar Bark Beetle

Phloeosinus sp. [unknown](#)

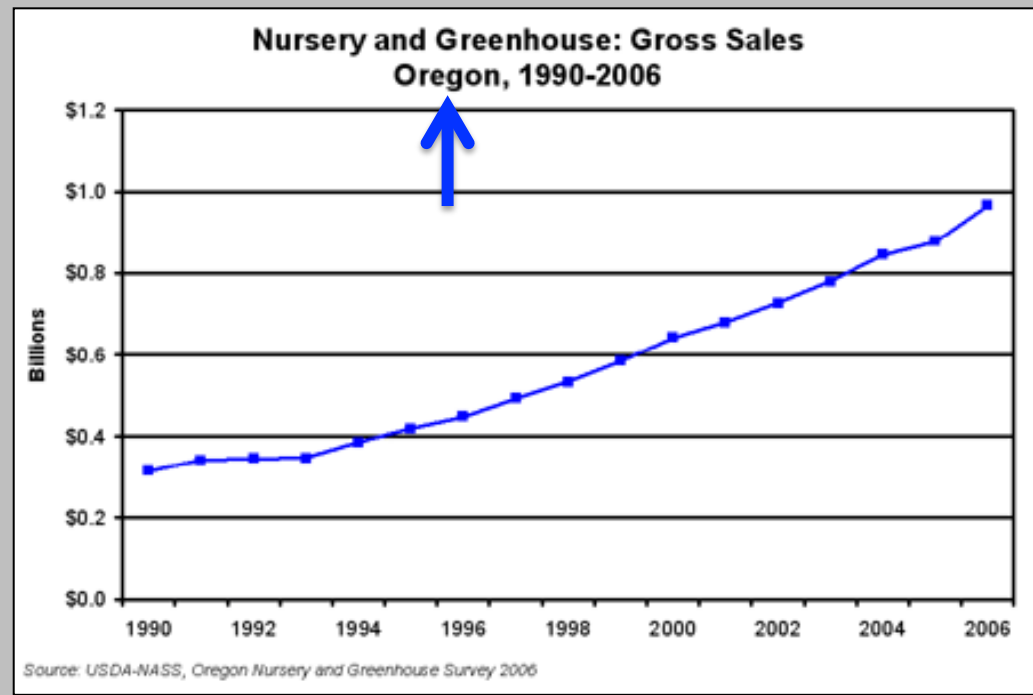


Live Plants From All Over!

**Over 3 BILLION live plants
imported into the U.S. in 2007!**

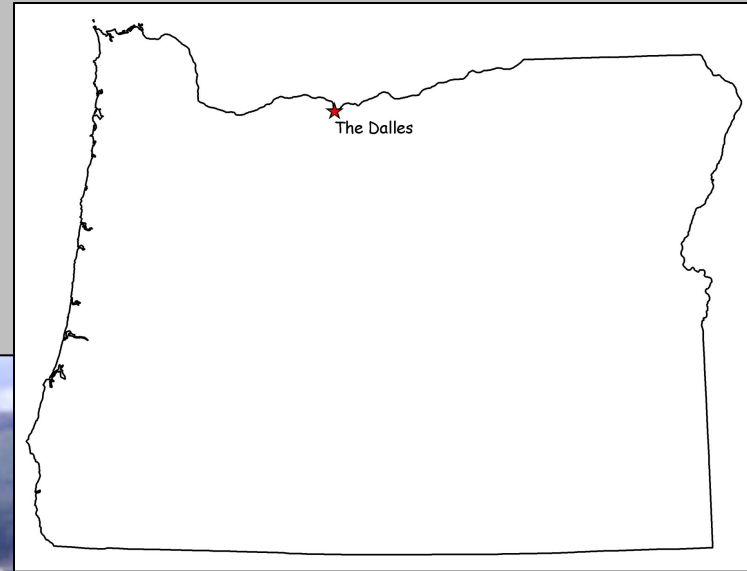


Domestic Commerce



Railroad Tie Creosoting Plant at The Dalles, OR

- **Receives raw railroad ties from U.S. (AK & S.E.) and B.C.**



- **Surveyed by ODA since 1998**



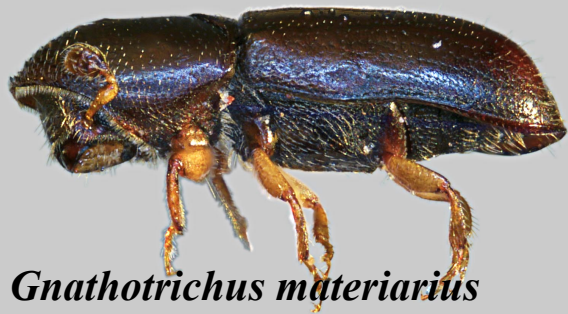
RUN 253 UP 8'6" OAK 6004 1372

UP 8'6" OAK

**Drying raw oak railroad ties
from the southeastern U.S.**



Drying raw hardwood railroad tie from SE U.S. with evidence of recent ambrosia beetle attack



Gnathotrichus materiarius

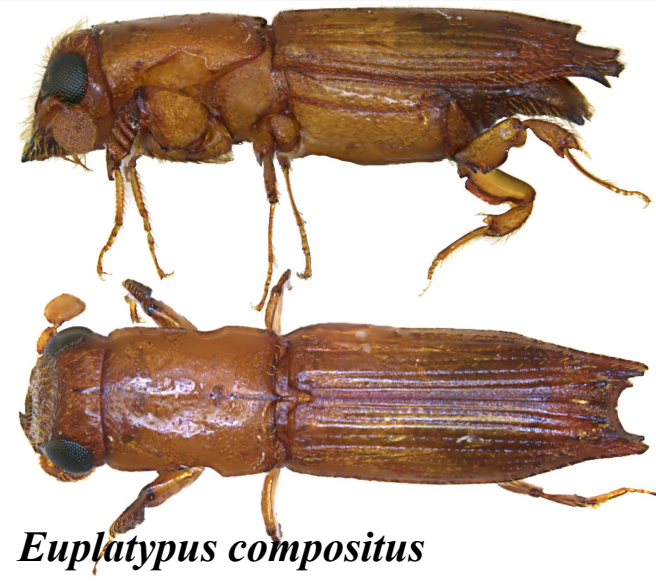


Monarthrum fasciatum

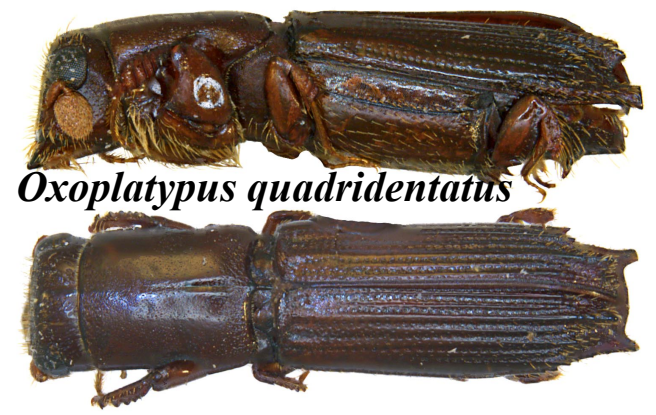


Monarthrum mali

Granulate ambrosia beetle



Euplatypus compositus



Oxoplatypus quadridentatus



ERADICATION

First Ever! of an Introduced Ambrosia Beetle



So, What Can You Do?

- **Keep your eyes peeled for suspicious damage or insects**
- **Contact Oregon Department of Agriculture if concerned**



Acknowledgements

- **The entire ODA imaging staff for almost all the wonderful insect images in this presentation:**
 - Chris Hedstrom**
 - Thomas Shahan**
 - Steve Valley (retired)**
- **Kimberley Brown, OSU, for inviting me to present today.**
- **You, the audience, for listening to me yet again this morning!**