



ACE Preparatory Course

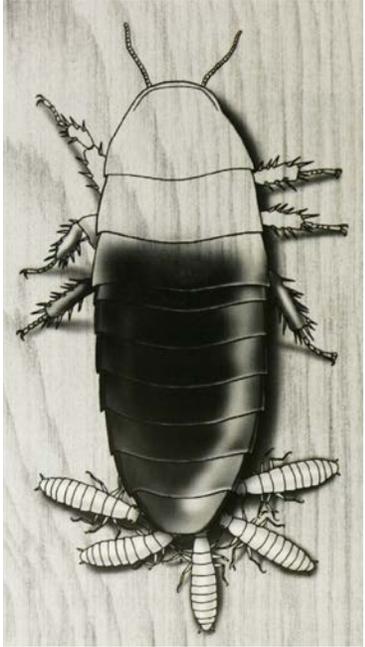
GENERAL PEST KNOWLEDGE:
WOOD DESTROYING INSECTS

Wood feeding in insects

Cellulose and lignins in wood are most abundant organic polymers in the world, but are mostly indigestible

Wood boring insects and termites have enzymes or microbes capable of digesting wood





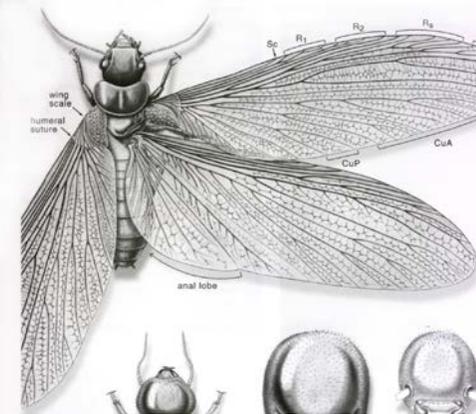
Order: Blattodea
Suborder: Isoptera

Termites: A suborder of the Cockroaches

DNA studies show that termites are a sister group for both cockroaches and mantids

Primitive termites, Mastotermes, have ootheca-like egg pods and carry cockroach bacteria

One group of cockroaches, Cryptocercus, displays primitive sociality and passes protozoa to its young





Termites

Suborder *Isoptera* (equal wings)

Only social insects with gradual metamorphosis

3 Castes in colony: workers, soldiers and reproductives (primary and secondary)

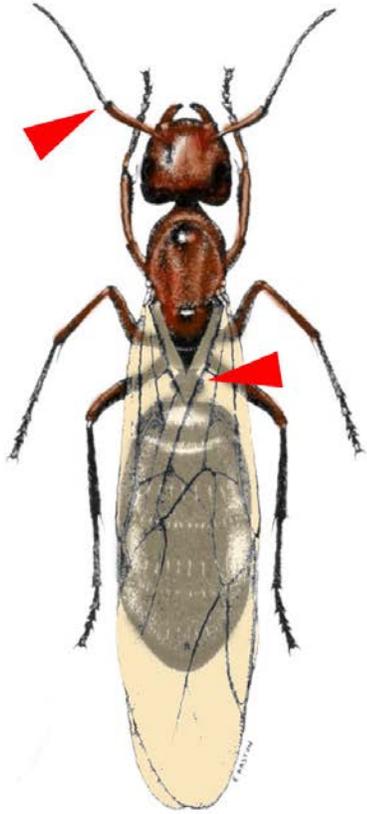
Termites

Digest wood with the aid of one celled protozoans, bacteria and special enzymes

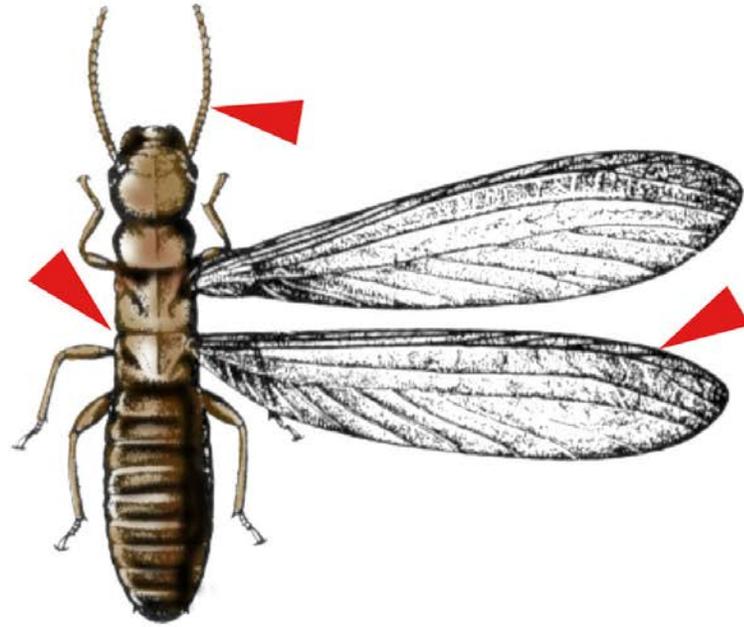
Nymphs obtain protozoa from workers through food sharing (trophallaxis)

Need soldiers or winged swarmers for identification





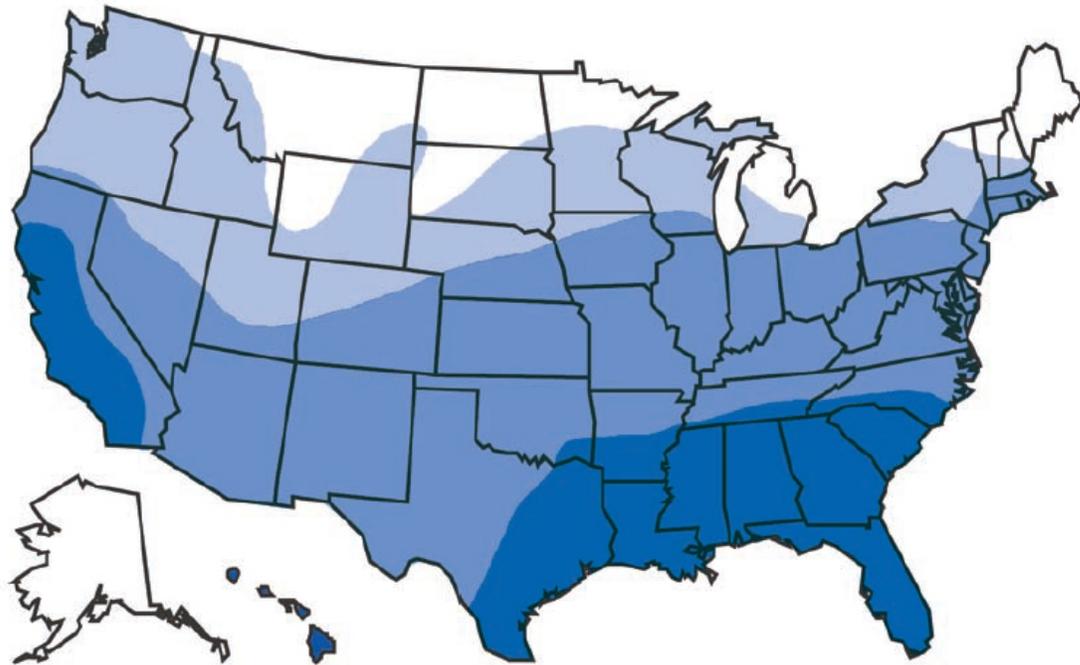
Ant



Termite

Comparison
with ants

Where is subterranean termite *damage* most important?



- Region I Very Heavy
- Region II Moderate to Heavy
- Region III Slight to Moderate
- Region IV None to Slight

One estimate: \$7 billion in annual damage

Damage more prevalent in warmer, humid parts of country



Subterranean Termites

Eastern Subterranean Termites, *Reticulitermes flavipes*

- Most common species in US
- colonies 50,000 to over 350,000 workers
- Mating flights early to late spring
- Swarmers have 2 veins on forewing
- Soldiers have smooth mandibles

Other eastern *Reticulitermes* species:

- *R. hageni* – light southeastern subterranean termite
- *R. virginicus* – dark southeastern subterranean termite

Subterranean Termites

Western Subterranean Termite, *Reticulitermes hesperus*

- West Coast to Mexico, Nevada to Idaho
- Colonies range from 5,000 to 500,000
- Alates are golden brown and fly in the evening or night after summer rains.



Reticulitermes hesperus

Subterranean termites

Heterotermes aureus

- Desert (or Sonoran) subterranean Termite
- surpasses *Reticulitermes* as the main subterranean termite in Southwest
- alates pale, rather than black
- Southern CA, AZ, Mexico
- Colony 45,000 to 300,000
- Foraging tunnels often include “drop tunnels”



Subterranean Termites

Coptotermes formosanus

- Formosan Subterranean Termite
- First collected in SC in 1957, now throughout southern coastal communities
- Recycled railroad timbers a major source
- Large colonies (over 1 million)



Formosan subterranean termites, *Coptotermes formosanus*

Identification

- High percentage soldiers (10%)
- teardrop shaped head (soldiers)
- Swarmer wing covered with hairs, are yellowish orange and swarm at night



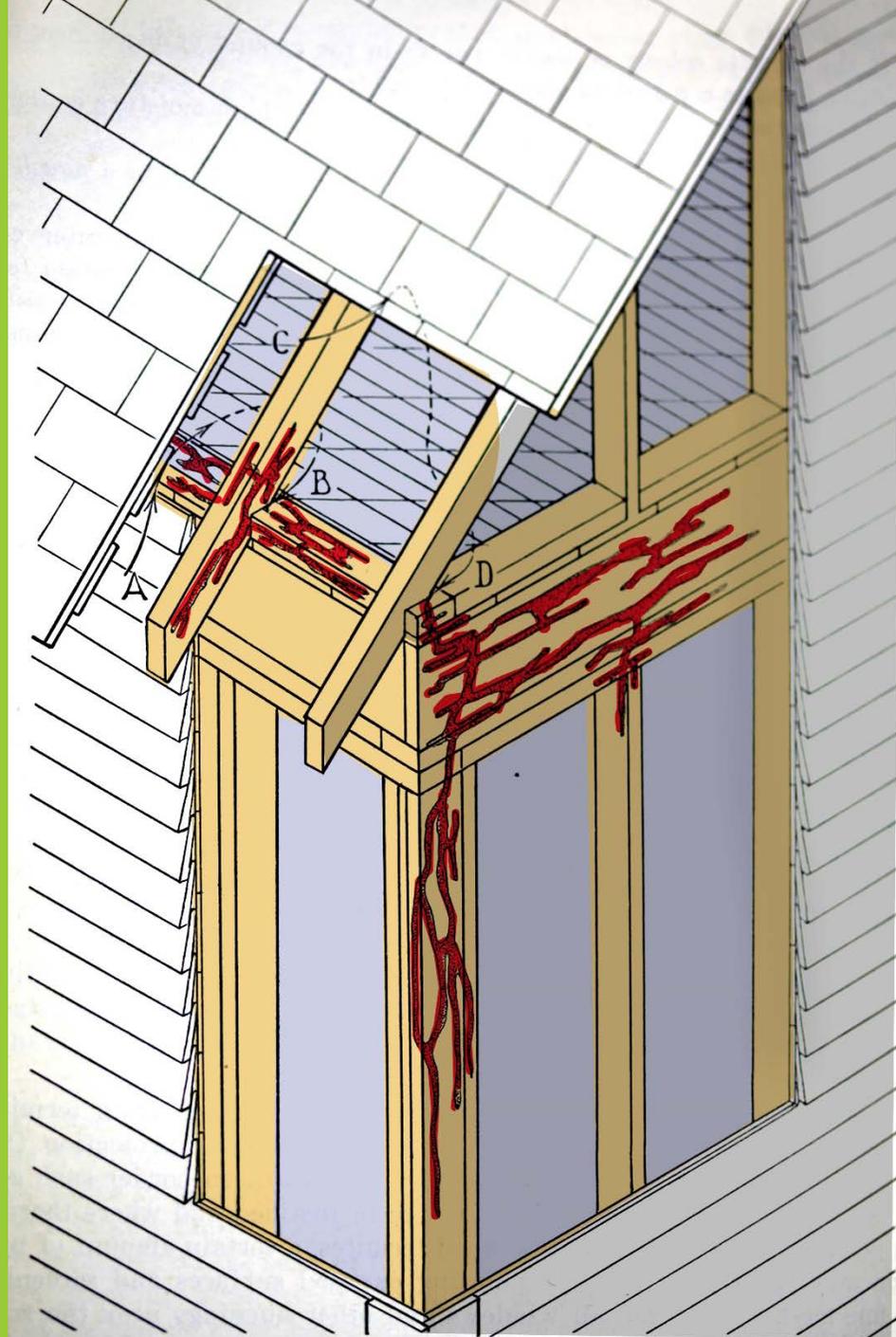
Drywood/Powderpost Termites (Family Kalotermitidae)

Require no contact with ground;
in wood <15% moisture

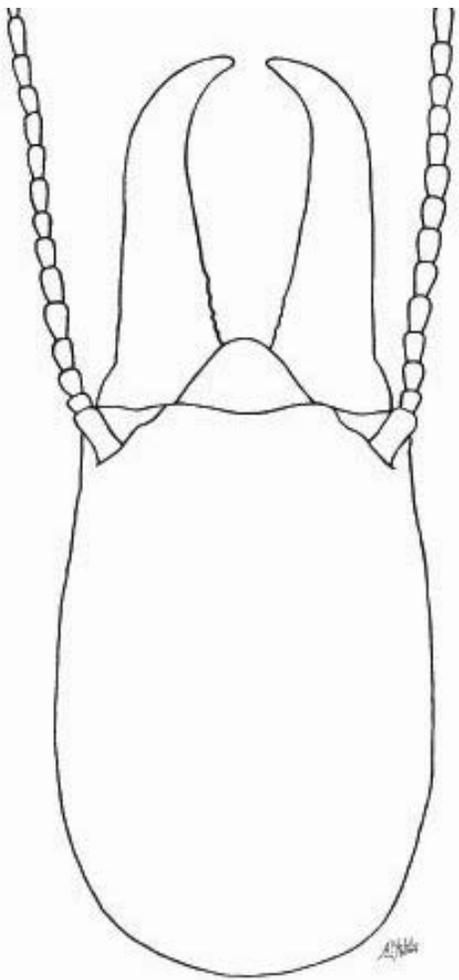
Serrated (saw-like) mandibles

Swarmers pale yellow with four anterior veins
swarm at night

Less than 5,000 in colony



Drawing from Kofoid



Soldier mandibles, Rhinotermitidae (subterranean termite, left) vs. Kalotermitidae (drywood termite, right)

Reticulitermes tibialis, Alex Yelich. Univ. Arizona

Incisitermes minor, R Scheffrahn. Univ. FL.



Note 4 strong veins on leading edge of wing



Note only 2 strong veins on leading edge of wing

Front wings, Kalotermitidae (drywood) vs. Rhinotermitidae (subterranean)

Western Drywood Termite. *Incisitermes minor*.
Photo courtesy R Scheffrahn. Univ. FL

Formosan Termite. *Coptotermes formosanus*.
Photo courtesy of R Scheffrahn. Univ. FL



Drywood termite Fecal Pellets

Hard, dry, with an elongate-oval shape, rounded ends & with six concave sides

Color varies from creamy to reddish brown to black

Do not change in shape, size or color over time.

Drywood pellets



Dampwood Termites

Not subterranean... require
moisture in wood to survive

Soldiers have serrated
mandibles

Night time swarms

Larger than other species



Wood boring beetles

Order Coleoptera

Complete metamorphosis

Attack hardwoods *or*
softwoods depending on
species



UGA0284084a



True powderpost beetles

Family Bostrichidae. Subfamily Lyctinae

Small, round exit holes 1/32 to 1/16 inch-diameter

Fine, silky frass without pellets

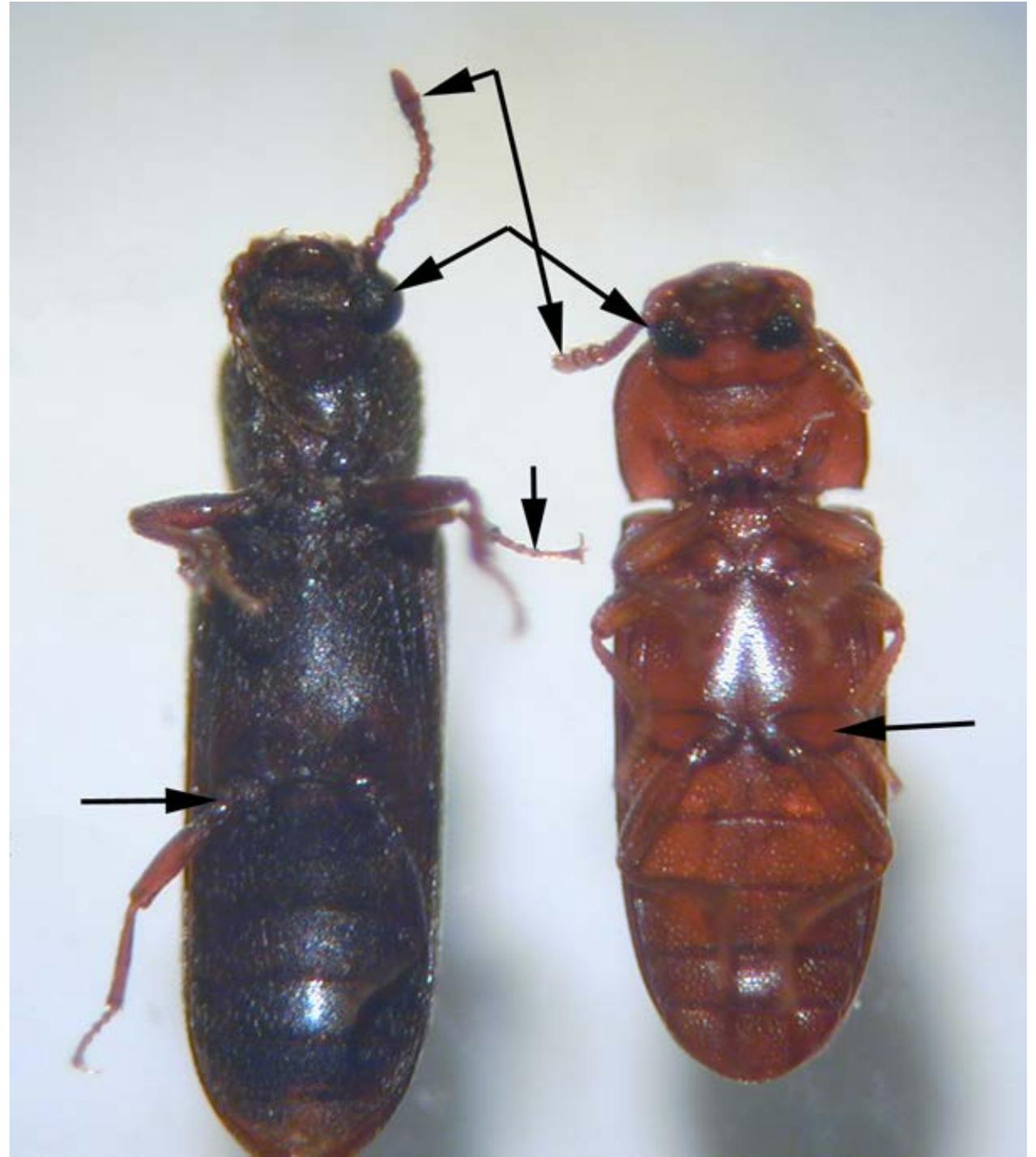
Attack hardwoods only

Flour vs powderpost beetle

fb has 3 segmented antennal club, ppb has 2 segments

ppb has globular eyes, fb eyes wrap around head

ppb hind coxae about 1/3 body
body





brought into homes in infested lumber

False powderpost beetles

Several species in Family
Bostrichidae (twig borers)

Exit holes...round 1/16 to
5/16 of an inch

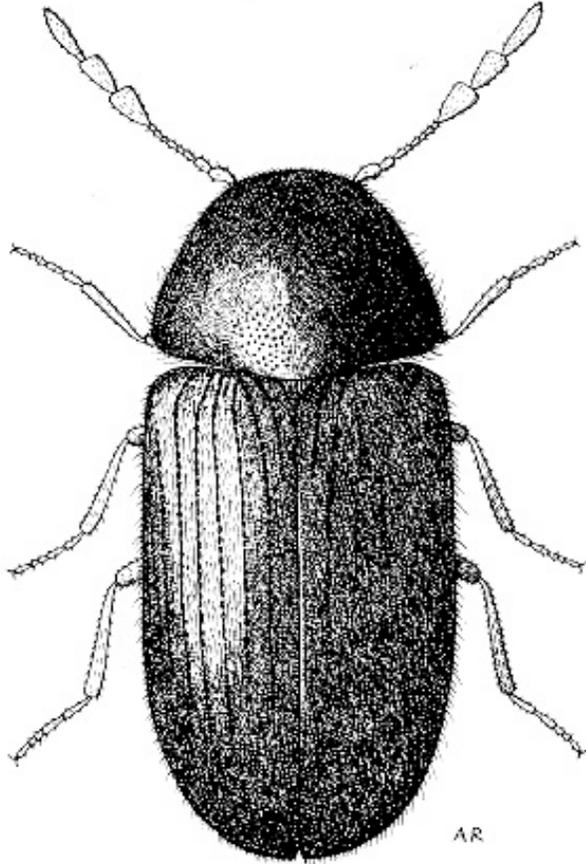
Coarse, tightly packed frass

Attack soft and hardwoods

Tend not to re-infest



Heterobostrichus hamatipennis;



Anobiid Beetles

Exit holes round 1/16 to 1/8 of an inch

Elongated, loosely packed frass

Attack hard and softwoods

Prefer high moisture content (>15%) May re-infest in areas with high ambient humidity.



Longhorn beetles (round-headed borers)

Coleoptera: Cerambycidae

Most attack only dying or recently felled trees with bark

May emerge inside structures

When found inside homes:

- infested wood was used in construction
- Emerged from firewood

Do not generally re-infest

Old house borer

One of only longhorn beetles that will re-infest structural wood

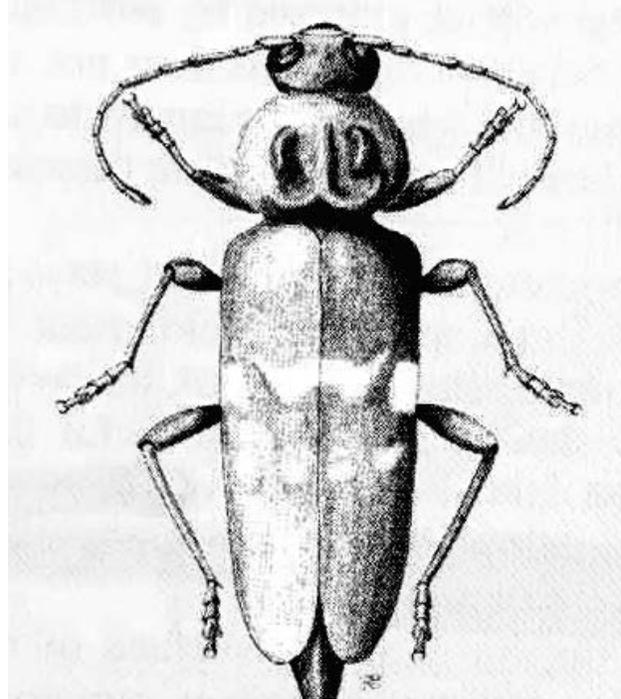
Exit holes oval, $\frac{1}{4}$ to $\frac{3}{8}$ of an inch

Tightly packed, coarse frass

Leaves distinctive ripple patterns on damaged wood

Attacks softwoods less than 10 yrs old

Can re-infest



Carpenter ants, *Campanotus* spp.

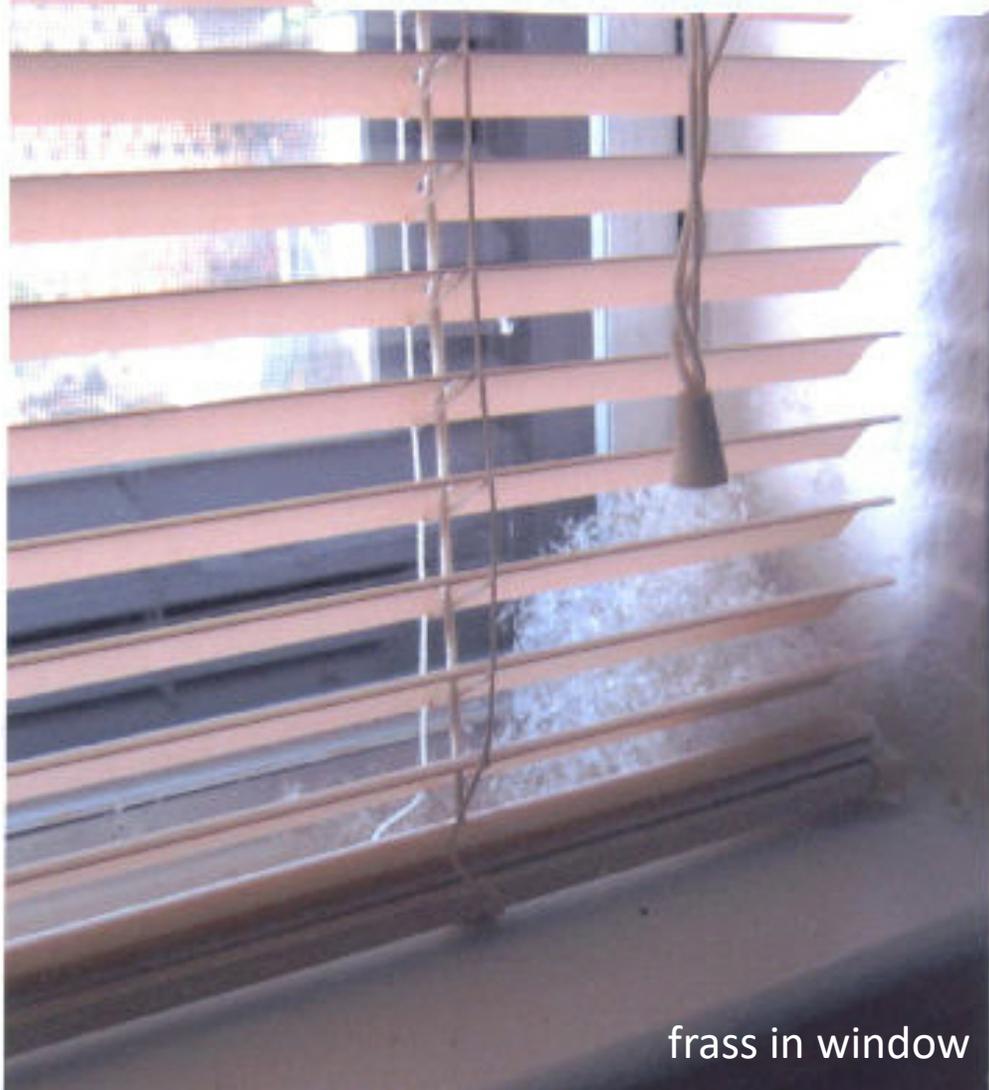
Order Hymenoptera: Family Formicidae

- Polymorphic..multiple worker sizes
- single node between abdomen and thorax
- relatively large
- galleries smooth, without mud



Male carpenter ant alate





Carpenter Ants

Primarily nocturnal

Excavate wood or other materials for *nests* in trees, stumps structures

Satellite colonies are common with main colony in tree or stump

Often eject frass from colony galleries

- look for insect fragments, pupal cases to confirm
- May or may not include wood shavings depending on species



Termites use which of the following to digest the cellulose found in wood?

bacteria

protozoa

enzymes

all of the above

Which of the following termite species are most likely to be found attacking wood with moisture levels less than 15%?

Formosan termite
(*Coptotermes formosanus*)

Eastern subterranean termite
(*Reticulitermes flavipes*)

Desert termite (*Heterotermes aureus*)

Powderpost termite
(*Cryptotermes brevis*)



A concrete slab supported entirely on the fill material or native soil beneath and always has a perimeter expansion joint is what type of foundation?

Supported Slab

Floating Slab

Monolithic Slab

None of the above



Wood heavily infested with Powderpost beetles is riddled with hole and galleries packed with dusty frass. Beetle frass is made of:

Wood that has passed through the digestive tract of beetle larvae

Soil brought into the wood by the beetle adults

Wood that has passed through the digestive tract of adult beetles

Questions?

