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Structure-Infesting Wood-Boring Beetles

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Several kinds of beetles damage stored wood, structural timbers and other wood products. The tunneling activities of the larvae and the emergence of adults can weaken wood and may destroy its appearance.

Wood-boring beetles come from at least 12 insect families and vary greatly in size, wood preference, nature of damage and other habits. Although preventing beetle infestations is desirable, control measures are available if infestations are found. To control wood-boring beetles, it is extremely important that the beetles or beetle damage be identified properly, as control measures vary by species.

Other insects also attack and damage wood, including termites, carpenter ants and carpenter bees. Their appearance and damage characteristics vary greatly.

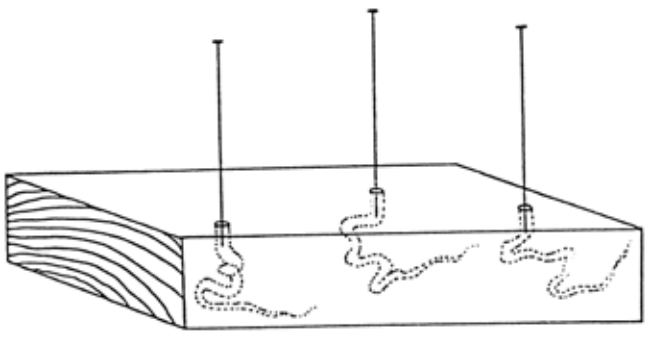
Detection

There are several indicators that wood-boring beetles are present. Probably the most common sign of a wood-boring beetle infestation is the presence of holes chewed by the adult beetles upon emergence.

Another indicator is a powdery material called frass that beetles often produce while feeding. Frass is plant fragments made by a wood-boring insect; it is usually mixed with excrement. The beetles push the frass from the holes they have made in the infested wood. This frass usually gets piled below the holes or in cracks in structures. The consistency of the frass ranges from very fine to coarse, depending on the species.

Sometimes an infestation is indicated by the presence of wood-boring beetle adults. Adult beetles that emerge in confined structures are attracted to lights or windows and may accumulate at these locations.

Other signs of an infestation include stained wood or a blistering appearance on the wood surface caused by larvae tunneling just below the surface. Less commonly, immature beetles produce audible rasping or ticking sounds while chewing on the wood. These chewing sounds are most often heard during quiet times at night.



Powderpost beetle tunneling.

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Identification

If you discover beetle adults, beetle larvae or other evidence of an infestation, obtain a correct identification of the beetle family or species involved. Identification is important to make informed decisions about whether the beetles are likely to continue to attack the wood in your home and whether treatment is justified.

Adult wood-boring beetles range from under ⅛ inch to more than 2 inches long. Although many are dark colored, some are metallic blues, metallic greens or striped with yellow or red. If you find only adults, try to find any emergence holes or damaged wood, which identifies the area infested.

Immature wood-boring beetles usually remain inside the wood and therefore are seldom seen. These grubs are typically soft and fleshy, white to cream-colored with a distinct head capsule that is brownish. The size varies from very tiny just after hatching to more than 2 inches long. The bodies are noticeably segmented and elongate. They may be cylindrical or flattened.

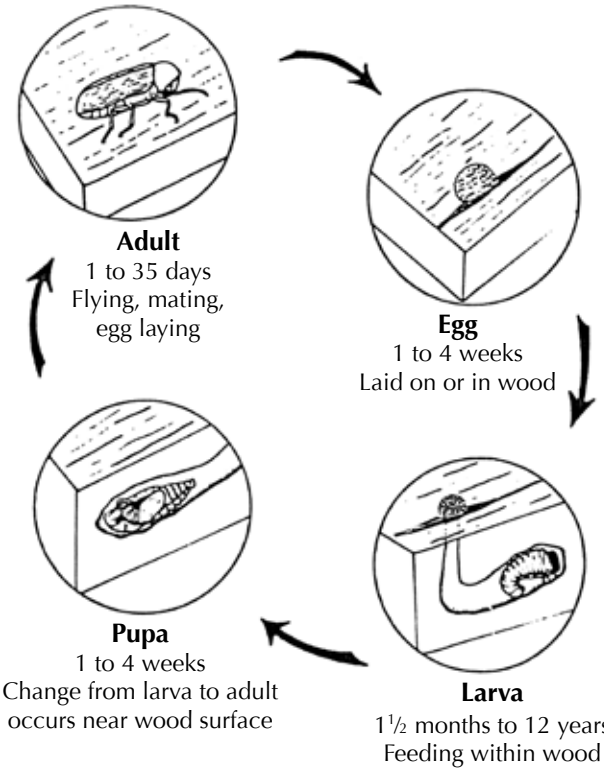
Knowing the kind of wood—hardwood or softwood—can help you identify the beetle species involved. Sometimes wood-boring beetles enter homes accidentally because they are attracted by lights; in these cases, they almost never damage property. More often, beetle infestations arise from the use of infested wood during the construction of the house.

Biology and habits

Wood-boring beetles have four life stages: egg, larva, pupa and adult. The eggs and pupae do not feed. Larvae, or grubs, are the main damaging stage, but the adults of some species can also damage wood.

Most types of wood-boring beetles do not damage seasoned structural timbers or finished wood products. However, if infested wood is used in construction, beetles can emerge from structural timber, doors, flooring, molding or paneling.

The length of the life cycle (egg to adult stage) of wood-boring beetles varies greatly among species and under different environmental conditions. Some beetles complete a life cycle within a few months; others have been known to live in wood as larvae for up to 30 years before emerging as adults. This complicates detection and control because it is difficult to assess the length of time an infestation has been present. The variation in biology for these beetles is outlined in Table 1.



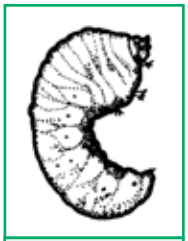
Typical wood-boring beetle life cycle.

The emergence holes of wood-boring beetles are usually round, but some species produce semicircular or oval holes. The shape and size of the emergence holes can help identify beetle groups.

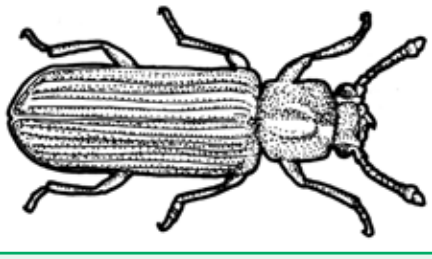
The type and location of frass is also characteristic of various beetle groups. Notice whether it is packed into the tunnels or extruded through exit holes. Also, note its texture (powdery, pelletized, coarse or shredded). All these characteristics can help identify beetles when no specimen is available. A hand lens is often helpful to determine the frass characteristics of wood-infesting beetles.

Often, various beetle groups can be recognized and control measures planned based on knowledge of their wood preferences. Table 2 summarizes the types of wood attacked, the usual damage or emergence sites in buildings and reinfestation capabilities. This table should help in planning appropriate control measures.

For instance, the lyctid powderpost beetles attack only seasoned hardwoods, and they are serious pests when they do. Thus, lyctid powderpost beetles found in hardwood floors, wood trim, or furniture would not be expected to attack softwood such as pine timbers in a home. On the other hand, deathwatch beetles attack both softwoods and hardwoods, and they generally feed on seasoned wood.



Powderpost larva (3-5 mm)

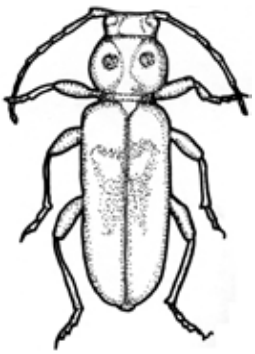


Typical length of powderpost beetle adult (4-6 mm)

Table 1. Biological characteristics of wood destroying beetles.

Group	Exit hole		Destructive stage	Typical length of life cycle	Types of frass
	Diameter	Shape			
Lyctidae (Powderpost beetles)	1/32 to 1/16 inch	Round	Larva	3 months to 1 year	Flour or talc-like; readily pours out of exit holes and cracks
Anobidae (Deathwatch beetles)	1/16 to 1/8 inch	Round	Larva	1 to 3 years	Fine to coarse; pellet shapes; usually a gritty quality; loose in tunnels; little at exit holes
Bostrichidae (False powderpost beetles)	1/8 to 3/8 inch	Round	Larva and adult	Usually 1 year	Fine to coarse; tightly packed; tends to stick together
Ptinidae (Spider beetles)	1/16 to 1/12 inch	Round	Larva	Several months under favorable conditions	Fine and powdery; fills larval tunnels
Curculionidae (Weevils, snout beetles)	1/32 to 1/16 inch	Round	Larva and adult	Varies with species	Powdery or granular dusts packed in irregular tunnels
Buprestidae (Flatheaded borers)	1/32 to 1/2 inch	Oval	Larva	1 to 30 years	None at exit holes; coarse powder in tunnels
Oedemeridae (Wharf borer)	1/4 inch	Round	Larva	About 1 year	Shredded and moist
Cerambycidae (Roundheaded borers)					
1. Old house borer	1/4 inch	Oval	Larva	1 to 32 years (normally 3 to 10)	Tunnels filled with powdery dust often formed in pellets
2. Flat oak borer	1/16 to 1/12 inch	Slightly oval	Larva	1 to several years	Tunnels packed with fine flourlike dust and granules
3. Other roundheaded borers	1/8 to 1/2 inch	Round	Larva	Variable	Coarse and fibery in tunnels
Scolytidae (Bark beetles)	Less than 1/16 inch	Round	Adult and larva	2 months to 1 year or more	Little or none at exit holes; very little or none in tunnels
Brentidae, Lymexylidae, and Tenebrionidae (Timber worms)	Less than 1/32 to 1/8 inch	Round	Larva	Unknown; probably several years	Galleries free of frass and not stained

Old house borer larva



Typical length of old house borer adults (12-18 mm)

One of the most significant wood infesting beetles is the old house borer, which is a member of the roundheaded wood borer family. It generally attacks structural softwoods. Contrary to its name, it is often a pest in newer homes built with infested wood. Wood becomes susceptible to attack if it is improperly kiln-dried or treated, or stored too long. This insect will readily reinfest structural timbers.

Because other beetle groups do not reinfest structural timbers, controlling them may be unnecessary. Most flatheaded borers, roundheaded wood borers and bark beetles are found shortly after a structure is built. Adults of these species generally will emerge within a few years after a building has been constructed. These beetles do not normally reinfest seasoned structural wood.

Prevention

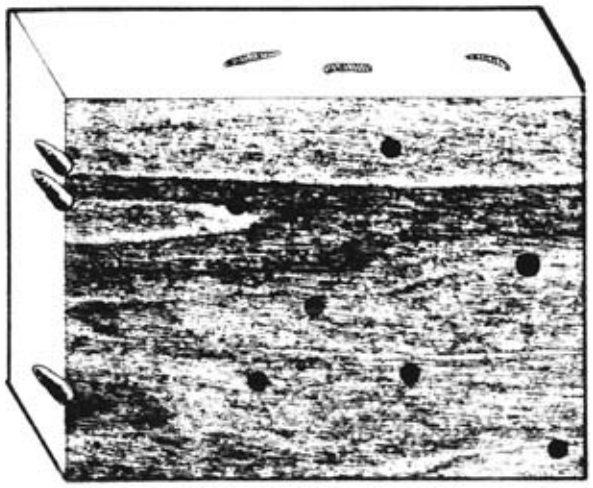
Prevention is the best way to avoid damage caused by wood-boring beetles. Several standard procedures are available to eliminate or avoid these problems.

Some management efforts start when the wood is harvested. Timber should have the bark removed soon after it is felled, to inhibit egg

Table 2. Attack sites of wood-destroying beetles.

	Timbers attacked						Wood stage attack			Adult emergence sites and damage in buildings				Reinfestation
	Unseasoned	Seasoned	Softwood	Hardwood	Sapwood	Heartwood	Living trees	Dying trees or recently felled logs	Seasoned lumber and wood products	Woodwork and/or flooring	Structural timbers	Furniture, tool handles, etc.	Firewood	
Powderpost beetles		X		X	X				X	X	X	X	X	Yes
Death watch beetles		X	X	X	X	X		X	X	X	X	X	*	Yes
False powderpost beetles	X	X	X	X	X			X	X	X	X	X	X	Rarely
Spider beetles		X	X	X				X	X	X	X			No
Snout beetles	X	X	X		X	X	X	X	X	X	X		X	Yes
Flatheaded borers	X	*	X	X	X	X	X	X	*	X	X	*	X	No
Wharf borer		X	X	X	X	X								Yes
Roundheaded borers														
1. Old house borer		X	X		X				X	X	X			Yes
2. Flat oak borer		X		X	X	X			X	X				No
3. Other roundheaded borers	X		X	X	X	X	X	X	X	X	X	*	X	No
Bark beetles	X	**	X	X	X	X	X	X	*		X	X	X	No
Timber worms	X			X			X	X					X	No

*Possible **Rarely



Powderpost beetle damage.

laying of wood-boring beetles. Lumber should be removed from the forest as quickly as possible and allowed to dry. Kiln drying of lumber will kill beetles infesting the wood. However, because kiln drying has no lasting effects, reinfestation is possible in some situations.

Before buying wood, evaluate it closely by inspecting it for exit holes or other signs of infestation. Buy and use only structural wood and wood trim that has been properly kiln-dried or chemically treated. Proper kiln-drying will eliminate any infestation. However, infestations may still occur in wood that is stored after being kiln-dried. Wood that is treated chemically in pressure chambers will resist infestation for many years.

Control moisture in the home or structure. Moisture-control options include repairing leaks and installing vapor barriers, insulation, dehumidifiers and air conditioners. Most wood-infesting beetles cannot develop in wood that has a moisture content of less than 15 percent. Low moisture will also help prevent decay, which can aggravate wood-boring beetle problems.

Maintain a fresh coat of paint or varnish on all furniture or exposed wood in your home. Most wood-boring beetle species will not reinfest wood that is painted, varnished, waxed or covered with some other type of finished surface. Avoid introducing new sources of wood-boring beetles, such as firewood. Adult beetles and various other pests can emerge from wood temporarily stored in the home and then infest structural wood or furniture or become a nuisance.

Store firewood as far from the home as possible or at least stack it away from the outer walls. Bring in only the wood that will be used immediately.

Before buying, carefully inspect antique furniture, picture frames, bamboo products and other wood items. Consider the wood to be actively infested if you see any evidence of recent emergence holes, larval infestations or frass. Treat these items properly before placing them in your home or in storage.

Control

Several options are available for controlling wood-boring beetles. First, try to identify the specific beetle or beetle group involved. Once recognized, determine the extent of the damage and evaluate the structural characteristics of the infested building. This information will help you determine a proper plan for any control efforts.

The most common methods used to control wood-infesting beetles include replacement of infested wood, temperature treatment of the wood, surface treatment with insecticides, or fumigation. If the infestation is localized, replacing infested wood is often a good choice. Remove or replace structural wood or furniture whenever it is economically feasible. Replacement reduces the risk of spread or reinfestation and eliminates any unsightly damage visible in the finished structure.

It is difficult to treat an entire structure for wood-boring beetles with heat or cold. However, it is feasible to treat small home furnishings, wooden artifacts or furniture by freezing or heating them to eliminate wood-boring beetles. To freeze wood-boring beetle larvae, maintain the wooden items at about 0 degrees F for several weeks to eliminate an infestation, because many wood-boring beetles are resistant to cold temperatures.

Alternately, heat can kill insects in wood by maintaining the wood at temperatures of 140 to 150 degrees F for 2 to 4 hours. However, wood thicker than 2 inches may take a long time to heat internally, so expect to hold the wood much longer at appropriate temperatures. Be aware that surface temperatures of wood seldom reflect the internal temperature. Extremely high temperatures probably help reduce beetle infestations in many attics.

Pesticide treatments for wood-boring beetles are best done by a licensed pest control operator. A localized infestation may be treated by spraying or brushing a residual insecticide on the wood surface.

Depending on the product used, the insecticide may stay near the surface or penetrate deeper. Insecticides that stay near the surface affect only the adults that emerge from the wood or attempts to reinfest the wood. Larval development beneath the wood surface often continues. Surface treatments that do not penetrate generally do not control infestations of wood-boring beetles that bore deeply into the wood. Some of those, such as the old house borer, have adults that can mate and produce eggs without leaving their larval tunnels.

Products containing beta-cyfluthrin (Bayer® Power Force Carpenter Ant & Termite Killer Plus), bifenthrin (Ortho® Termite & Carpenter Ant Killer), and cyfluthrin (Bayer® Advanced® Home, Home Pest Control Indoor & Outdoor Insect Killer) are registered for homeowners to use to control wood-boring beetles. Several other products containing those active ingredients, or others such as cypermethrin, deltamethrin, fenvalerate, imidacloprid and lambda-cyhalothrin, are available to pest control operators. Because surface treatments with these products do not penetrate the wood very well, they are used primarily to prevent the next generation of wood-boring beetles from establishing in the wood.

Wood penetrating treatments are possible with water-soluble borate products such as Tim-Bor® and Bora-Care®. These products are best used on freshly installed wood before completion of home construction. Applications are typically made as a water emulsion applied twice, the second time before the first application dries completely. Applications to unfinished wood surfaces will allow some penetration into the wood.

However, many types of wood finishes—paint, varnish, wax—do not permit insecticide penetration. Also, outdoor structures or wood surfaces that are exposed to moisture are poor candidates for treatment with borates because of leaching. Water exposure tends to draw out soluble compounds, rendering the treatments less effective over time.

The most reliable and effective method of eliminating wood-boring beetles is fumigation. Fumigation involves introducing a toxic gas into a structure, usually under a gas-proof tarp. The fumigant gas penetrates beneath the wood's surface to kill all life stages of the beetle.

Fumigation does not prevent subsequent reinfestation. Because it is a costly, highly technical and hazardous process, fumigation must be done by a licensed pest control operators experienced with this technique.

Insecticide label clearances are subject to change and changes may have occurred since this publication was printed. The pesticide **user** is always responsible for the effects of pesticides on his own plants or household goods as well as problems caused by drift from his property to other property or plants. *Always read and follow carefully the instructions on the container label.*

A previous version of this publication was written by J. A. Jackman and P. J. Hamman.

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Revision