Common Wood-Destroying Beetles

**Powderpost Beetles**

Powder post beetles are so named because they can reduce wood to finely powdered frass (powder or dust). The small “shot hole” exit openings in wood surfaces are great indications of a powderpost beetle infestation.

Adult powder post beetles are rarely seen, and are usually found in a home by the presence of small exit holes noted in sills, joists, or the sub-floor. Their unusually long antennae best distinguish powder post beetles. Other characteristics that usually identify them are being white, yellow; soft bodied, hairy with five jointed legs. The life cycle of a beetle may take up to a year. They are considered to be the second most destructive wood-destroying insects.

**Different Kinds of Woods**

Some powder post beetles confine their activities to starch-rich, large-pored hardwoods, such as ash, hickory, oak, walnut, and cherry. Many different kinds of wood commodities and structures have been damaged by powderpost beetle infestations. Timbers, planks and flooring in houses and barns, axe and hammer handles, musical instruments and museum woodcarvings are all good examples of items damaged or destroyed. Powderpost beetles often are a serious problem for individuals remodeling or renovating old buildings and/or salvaging lumber from old wooden structures. Keep in mind that powderpost beetles can infest any item made of wood.

Powder post beetles belong to four Families: **Lyctidae**, the Lyctus and/or “True” Powder Post Beetles; **Bostrichidae**, the large and/or “False” PowderPost Beetles; **Anobiidae**, the Deathwatch,
Furniture or Anobiid PowderPost Beetles; and *Ptinidae*, the Spider Beetles.

**Identification of Powderpost Beetles**

**Lyctid or “True” Powderpost Beetles**

In the United States, there are more than 35 kinds of lyctid beetles. These are considered the “true” powderpost beetles. The adults are very small; less than 1/4” in size and slender. They are flattened and range in color from reddish-brown to black. Larvae are white, cream colored, and shaped with dark brown heads and they create tunnels in the wood and become pupae. The head is visible from above. The antennal club has two segments.

As adults they bore through the wood, pushing a fine powdery dust out, leaving pinholes about 1/32-1/16 of an inch in size. Lyctid beetles infest hardwoods such as oak. They can live in wood with a wide moisture range, from a dry 8 percent to a very moist 32 percent. They attack hardwoods by depositing their eggs. Their average life cycle is about one year.

**Female Powder Post Beetle**

The female lays her eggs in the pores of the wood, so hardwoods (which have pores) are the most likely to be infested. Only the sapwood of hardwoods is eaten, because only it contains the starch required in the diet of these beetles. Once hatched, young larvae bore into the wood. Unlike termites, they are unable to digest cellulose. Consequently, most of the wood eaten passes through the larva. This is left behind as a powdery frass.

**Diet**

Their diet consists of starch, sugar and protein in the sapwood of hardwoods. Wood containing less than 6% moisture content is seldom attacked. This wood-boring beetle is the most widespread in the U.S. Many times infestations are built into structures from infested lumber, and they can re-
infest.

**Damage**

Lyctid damage is characterized by the extremely fine frass (which resembles flour or talc) that readily falls out of exit holes.

Frass left by other woodborers usually contain pellets, has a course texture and a tendency to stick together. When inspecting damage, be sure to distinguish old damage from active beetle infestations. Recently formed holes and frass (sawdust like) are light in color and clear in appearance, old holes and frass are dark in color.

**Wood Damage**

Fortunately, relatively few insects actually damage sound wood. Termites, both subterranean and drywood, carpenter ants and certain powderpost beetles are the primary wood destroying insects. The potential for damage from any of these insects varies by region and climate with more potential damage in warm, wet climates and generally less in cool, dry climates.

Damage potential in a particular region varies by insect group as well. Termites, for example, tend to be of more concern in warm climates whereas carpenter ants tend to be more important in cooler climates.

**Climates**

Wood-boring powderpost beetles damage structural wood mostly in damp/coastal climates.

Powderpost beetles can, however, damage hardwoods, like flooring and furniture, in any climate.

There are also a number of minor wood damaging insects that may do significant cosmetic damage but rarely impact wood's structural integrity. Below is a list of all these insects and their potential for damage.

**Bostrichid or “False” Powderpost Beetles**
Adults are 1/8 to 1 inch long, cylindrical, and reddish brown to black. Adults bore into the wood to lay eggs, leaving a hole larger than 1/8 inch, usually in wood less than 10 years old. Larvae are curved and wrinkled.

False Powderpost beetles are larger than other families of powder post beetles, leaving larger exit holes. Holes do not contain frass, though the galleries do. Frass is tightly packed, tends to stick together and is extremely fine in texture. It contains no pellets.

**False Powder Post Beetle**

Diet

Their diet is dependent on starch in the wood. They are most common found in softwood, but can attack hardwoods. They require 6-30% moisture content in the wood. Their average life cycle is one year. Most hardwoods attacked are not those commonly found used for interior floors, woodwork or trim. They are often found in oak, firewood and furniture.

Most false powder post beetles do not reinfest wood after it is seasoned, so damage is limited to that inflicted by one generation. The speed of the damage can be considerable.

**Anobiid Powder post Beetle --- Furniture and Deathwatch Beetles**

Anobiid beetles are usually slightly less than 1/3 inch long, and red to brown/black in color. The head is not visible from above and there is no antennal club. Females mate often during their lifetime. The total number of eggs laid per female is about 50. Their eggs are deposited in cracks and crevices of all types of seasoned wood, but these beetles seem to prefer the sapwood of softwood trees. However, females prefer to lay eggs on hardwoods, rather than softwoods, and prefer rough wood surfaces.

**Deathwatch Beetle**

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The **Deathwatch Beetle** is found throughout the southeastern U.S. and attacks building timbers in poorly ventilated areas where moisture tends to collect. The name “Death watch” comes from a mating call which is a ticking sound that the adult makes inside infested wood. This sound is audible during a still night.

**Furniture Beetle**

Furniture beetle is found primarily in the eastern half of the U.S. It infests structural timbers as well as furniture. Adults are 1/8 – 1/4 inch long. They are red to dark brown in color with an oval shape. Adults lay their eggs in the cracks and crevices of seasoned wood. As soon as they hatch, larvae burrow into the wood where they live and tunnel for a year or more. Larvae form tunnels in both softwoods and hardwoods and require 13-30% moisture content. Larvae are slightly curved and wrinkled, with tiny hairs on the body. The larvae feed in the sapwood portion of the wood, and both new (less than 10 years) and old wood are attacked. Anobiid powder post beetles have a 1-5 year life cycle, depending on the quality of the wood infested, the fluctuations in temperature, and the moisture content of the wood. The adult beetles usually begin emerging from infested wood in early spring, and continue till mid-summer. The adults are nocturnal, and they become most active on the surface of the wood between dusk and midnight.

The susceptibility of various kinds of wood to attack by this species depends on the age, surface features, and the species of wood. A fine to coarse wood characterizes an infestation, powdery frass containing bun-shaped fecal pellets. Holes are round, 1/16-1/8 inch. The frass is loose in tunnels with small amounts at exit holes.

**Infestations**

Infestations can become so severe that loss of structural strength to sills, joists, and sub-flooring

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occurs. Anobiids commonly reinfest crawl space areas that are poorly ventilated and humidity is absorbed in the wood. Unlike the other powderpost beetles, anobiids have a digestive enzyme that allows them to digest cellulose from the wood and are inclined to the softwoods; for this reason they are common in crawl spaces and basements, infesting the pine used for framing lumber.

**Ptinidae Family - Brown Spider Beetle**

Ptinidae Members of this family possess long, 11-segmented antennae, positioned between the eyes, plus a number of characteristics which give them a spider-like appearance; a stout body with hairy surface; a waist-like constriction at the base of the prothorax; 6 (not 8) long thin legs with 5-segmented tarsi.

**Description**

From the family Ptinidae, this beetle may occasionally damage pine boards in old buildings. The white-marked spider beetle is a small, brown, oval, long-legged beetle about 1/8 inch long, and resembles a spider.

Its forewings are hard and leathery, meeting along mid-line of dorsal surface; hindwings membranous, sometimes lacking; biting mouthparts; well developed thorax; complete metamorphosis with egg, larval, pupal and adult stages.

Spider beetles are often found in old buildings and warehouses. They generally feed on dried vegetables or animal matter, but they have been found in pine and oak woodwork.

**Other Common Wood Destroying Beetles**

**Old House Borer**

This European insect is now well established in the U.S. and is becoming more abundant and destructive each year. This is one of the most common beetles from the Cerambycidae family. This beetle places its eggs in the season cracks and crevices of wood, and can infest seasoned wood years
after it has been used for construction. Larvae are thin-skinned, the head is wider than it is long, the
tips of the mandibles are rounded, and there are three ocelli (simple eyes) on each side of the head.
Adults are brownish-black to black, slightly flattened and about 3/4-1 inch long. The thorax is
rounded, with several small tubercles at the sides and a black polished line and spots on the upper
surface. The wing covers have whitish spots, which form irregular bands across their middle.
Average life cycle is usually five to seven years in the north and three to five in the south. It can take
up to twelve years if nutritional and environmental conditions are unfavorable. Because of the long
life cycle, reinfesting the wood, it may take years before you see any structural damage.

**Adult Old House Borer**

Old House Borers are commonly found in older buildings, but is more frequent in newer buildings (in
houses less than 10 years old). A larva hollows out galleries in seasoned softwood (pine). Exit holes
are about 1/4-3/8 inch in diameter, but damage may have occurred several years before spotting such
holes. They are able to digest cellulose.

When wood has been infested with fungi, the larval development is faster. Their powder (frass) in the tunnels is like sawdust, tightly packed.

**Flat Oak Borer**

This is a small, elongate, dorso-ventrally flattened, shiny beetle with a dull yellow color.

It is 1/3 to 2/5 inch long and occurs throughout the eastern U.S.

Larvae excavate long meandering galleries in the dry heartwood of oak and hickory, packing them tightly with fine granular frass.

Stored lumber is frequently infested and larval feed in it until wood is thoroughly riddled. The life cycle may be completed in one year in green logs and under forest conditions but lumber drying activities may extend larvae development to several years.
Ivory Marked Beetle

This beetle is elongate, one-half to one inch long, pale yellow in color. It has two pairs of ivory white spots on each wing cover, the first pair longitudinal and near the base, the second just behind the middle of the wing. Larvae are robust and wedge-shaped, tapering posteriorly, with a tough, shining integument (outer covering) sparsely covered with golden hairs.

The legs are distinct, long and four jointed. Adults may attack lumber undergoing seasoning.

Oak, hickory, ash, chestnut, maple, and cypress are susceptible to infestation. In buildings, beetles may emerge from flooring or furniture years after the infested wood is used.

Controlling Wood-Destroying Beetles

Prevention

Inspect periodically all exposed wood surfaces and probe them for evidence of internal damage. Evidence of attack is more common in attics, crawl spaces, unfinished basements and storage areas. To be certain that the infestation is active (not old damage or old frass), there should be fresh frass the color of newly sawed wood, or live larvae or adults in the wood.

Many powder post beetle problems are related to high moisture in the wood, particularly in crawlspace. Reduce the moisture content to proper ventilation to less than 20%. Central heat, vapor barriers and good ventilation can help control moisture.

Spot Treatments

Spot treatments include controlling wood moisture, using surface covers, mechanical removal freezing, and insecticide treatments.

Plastic sheets covering 70% of the crawl space will keep the lumber from getting too moist. Surface cover, including paint, polyurethane and water sealants will protect wood from moisture problems
and help prevent wood-boring beetles from penetrating the wood. Replacing the wood may be the best control strategy. As a preventive measure, inspect the floor or moldings beneath interior wood walls.

In many cases, the damage from wood boring beetles is very minor and old, meaning that all the beetles have died. If action is taken, the first thing to do is to reduce the moisture content, to proper ventilation to less than 20%. Moisture meters can be used to determine the moisture level in the wood.

_Freezing_ temperatures can kill wood-boring beetles, especially in small furniture. Access to a large freezer can be a considerable option. A sustained temperature of 0°F for at least 72 hours is required for this method to be effective. Eggs are very tolerant of cold, and this method may not be entirely effective as a result.

_Heat treatments_ for entire buildings are available. They are also likely to be expensive. They may be the only way to eradicate a heavy and widespread infestation without causing considerable damage to the building.

**Insecticides**

Spraying the wood with an insecticide is the most common method of chemical control for powder post beetles. Recommended borate insecticides are _Timbor_, a powder that mixes with water, and _Boracare_, a liquid borate. Pesticides containing "borate" are particularly effective against powder post beetles because they penetrate the wood and kill beetles feeding within wood, as well as killing adults entering or exiting the wood surface. _Timbor_ is considerably cheaper per gallon use.
Timbor is water soluble inorganic borage salt with insecticidal and fungicidal properties effective against wood-destroying organisms, including: subterranean termites, dry wood termites, damp wood termites, and carpenter ants, powderpost beetles (false powderpost beetles, furniture and deathwatch beetles, old house borers, longhorn beetles, and ambrosia beetles.) It’s best to use oil treatments since these penetrate better than emulsions and suspensions. Good penetration of insecticide is important.

**Surface Treatment**

Surface treatments usually do not prevent beetles already in wood from emerging. If the infestation appears to be localized (ex. only a few holes in a board or sheet of paneling), simply removing all infested wood and replacing the board or sheet of paneling may solve the problem. If additional holes begin to appear in adjacent areas, additional action can be taken such as using residual borate insecticides: Timbor and Boracare.

**Fumigation**

If you are concerned that wood behind walls or in other inaccessible areas is infested, then it may be necessary to fumigate. Fumigation is effective but gives no residual protection. Fumigation is an expensive means of ridding a structure of powderpost beetles and should be considered a last resort. However, in the case of severe, widespread infestations, it may be the only option. Instances where structural fumigations are warranted are when infestations have spread into walls, between floors, and other areas where access/wood removal is impractical. The best way to avoid such problems is through early detection and implementation of one or more of the corrective actions mentioned previously.

Fumigation of infested furniture, antiques and other manufactured articles can be done at a substantially lower cost than fumigating an entire building by placing the items under tarps, in trailers, or in vaults that maintain gas concentrations at high levels. Some pest control companies offer this service.

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Hosts, Habits, and Diagnosis

**Lyctidae:** Lyctids infest hardwoods with large pores, such as oak, walnut, ash, and hickory. Hardwoods with smaller pores, such as birch or maple, are rarely infested. Softwoods like pine, spruce, and fir are not susceptible to powderpost beetles. Powderpost beetles can also infest some woods of tropical origin (e.g., mahogany and obeche) and can attack bamboo although it is not wood. Powderpost beetles usually infest relatively new lumber, which has a higher starch content than older wood. Therefore, recently seasoned lumber and semi-manufactured wood products such as hardwood flooring, floor joists, and paneling are most vulnerable to attack. As wood ages, starch content decreases, making reinfestation less likely with time. Nonetheless, infestations have been observed in wood 40 years of age and older. Once starch levels drop below 3 percent, the beetles will no longer infest the wood. These beetles are often "built-in" to structures because lumber is infested when it is installed (as flooring), but they can also be brought inside the structure within wooden items, such as furniture or knick-knacks. The frass of true powderpost beetles is diagnostic; it has the consistency of talcum powder and has no grittiness at all.

**Anobiidae:** Anobiids infest the sapwood of both hardwoods and softwoods, although at times they will colonize heartwood as well. They are frequently found in older wood (10 or more years of age) and in high moisture areas. Some anobiids prefer to feed on wood infected with rot fungi. The frass produced by anobiids is often found in clumps or pellets and has a distinctively gritty or coarse feel. These beetles are infrequently reported in Minnesota, but cause extensive damage in the western and southeastern United States. In these areas, anobiids normally enter homes from outside, rather than being built in or brought in. In any region of the United States, anobiids may be brought...
into structures with imported antique furniture. One species of note in Minnesota is *Ptilinus ruficornis*, which attacks logs of aspen (*Populus* spp.) in rustic cabins.

**Bosrichidae:** Bosrichids are often found in both hardwoods and softwoods, though hardwoods are preferred. Bosrichids frequently attack woods of tropical origin such as lauan and mahogany. The frass of these beetles is a combination of fine powder, pellets, and larger wood chips, and is frequently cemented into the feeding galleries made by the larvae. In Minnesota, most reports of bosrichids result from furniture imported from Asian countries.

**Curculionidae:** *Hexarthrum ulkei* is a weevil that prefers moisture-damaged softwoods (like pine). It is generally found in older structures near bathrooms and other areas that are consistently exposed to water. The frass produced by *H. ulkei* consists of small oval pellets and is slightly gritty. Infestations of these beetles often occur in hidden places, and consequently, damage can be extensive.

**Description and Life History of Insects**

**Lyctidae:** Adult lyctids are small (1/32”-1/4”), slender, and uniform reddish-brown to black in color, with a prominent head easily visible from above. They are similar in appearance to some beetles that infest stored food (e.g., flour and grain beetles). Adult beetles lay tiny, cylindrical eggs in the pores of wood. Once the eggs hatch, larvae bore into the wood though larval entry holes are generally not visible to the naked eye. The larval galleries run with the grain of the wood and are generally short. The creamy-white, c-shaped larvae feed for 3-12 months (several years in some cases) and are responsible for all the damage. Damage is generally first noticed 6-12 months after initial infestation when the adult beetles emerge from the wood. When conditions permit, powderpost beetles will reinfest the same wood from which they emerge. In most cases, other wood products are unsuitable for attack because they are too dry, too moist, or are covered with a sealant (e.g. paint, varnish, or wax) that prevents egg laying.

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**Anobiidae:** Adult anobiids are also small, and vary in length from 1/16"-5/16". They are reddish-brown to black and are covered with fine hairs. Unlike lyctids, the head is not visible when viewed from above. They lay their round eggs in cracks and furrows in the wood, and bore both with and across the grain of the wood. The whitish, grub-like larvae feed for a long period of time and complete their life cycle in 1 to 5 years. Like lyctids, reinfestation occurs when conditions permit.

**Bostrichidae:** Bostrichids are large, normally between 1/8"-1/4" in length, though some can be much larger. They are reddish-brown to black in color. Like anobiids, the head of the bostrichid is not visible from above (with the exception of the black polycaon, Polycaon stoutii). Their eggs are slender and are deposited in pores exposed in "egg tunnels" that are constructed in the wood by the adult female. Beetle larvae typically feed for less than one year, though this time is lengthened as the wood dries out.

**Curculionidae:** *Hexarthrum ulkei* is a small weevil (snout beetle), between 1/8"-1/4" in length. The weevils are reddish-brown to dark brown in color with long rows of deep pits on their wing covers. Little is known about the basic biology of these weevils. They can easily reinfest moisture prone areas.

**Significance**

Powderpost, deathwatch, false-powderpost, and *H. ulkei* beetles are important because they feed on wood, damaging it and detracting from its appearance. Adults emerging from the wood leave small, circular exit holes (2-3 mm diameter), while larvae tunnel beneath the wood surface, converting solid wood into powder. In many cases, the holes can become so numerous that the damage looks like it was created by a shotgun blast. Most
Management

The first step in managing powderpost beetles is to determine whether the infestation is active. Wipe and vacuum all dust from the wood, and examine the area a week later. If the infestation is active, new holes and fresh sawdust should be visible. Be sure that what is seen is not old dust that has dislodged due to vibrations. Check more than once (even many months later) if it is unclear whether old or new dust is found. If no new dust is found, the infestation is not active, and no control is necessary. Another technique is to circle all the exit holes you see with a pencil. If weeks or months later no new holes have appeared, the infestation is not active.

The best control method for an active infestation depends upon the type and size of the wood product involved. Beetles can be killed by freezing the material at or below 0° F for four to seven days. Because powderpost beetles can acclimate to gradually falling temperatures, the decrease must be sudden for this technique to be effective. Wood left outdoors for extended periods of time should be placed in a plastic bag or wrapped in plastic. This prevents absorption of moisture which can damage wood products. Heating smaller wood products at 120° F for 2 hours should kill all stages of the beetle, but be sure that the item is heated all the way through. Use caution, however, since some wood products and their finishes may be damaged by prolonged freezing or heating.

Another control method is to protect the wood surface with varnish, paint, or other similar sealants. While this does not kill insects in the wood, it does prevent reinfestation by eliminating all sites appropriate for egg laying.

An application of insecticide can kill emerging adult beetles and prevent reinfestation, but it will not kill most insects already present in the wood. All insecticides effective for control of powderpost
beetles, such as borates (e.g. Tim-Bor, Bora-Care), or cyfluthrin (e.g. Tempo), can be purchased and applied only by licensed applicators. All of these insecticide treatments must be done over raw wood. Fumigation with methyl bromide or sulfuryl fluoride is another option that is suitable in situations where an outside source of reinfesting beetles is not present. Fumigation can be done to individual items (in small "tents") or to an entire structure, and is the only method that will kill beetles (in any stage) deep inside the wood that is part of the structure.

If the wood has been so badly infested that structural damage is evident, replace it with kiln-dried lumber. Because beetles may be present in the area of infestation, all new, unfinished, or otherwise susceptible wood should be protected with paint, varnish, another sealant, or an insecticide.

Managing Infestations

Moisture

It is important to reduce excessive moisture in humid situations like crawlspace, basements, and other locations; leaky roofs or plumbing should be repaired. Ventilate humid situations where possible.

Single Items

If evidence is limited to a single board, piece of molding, or other item, removal and replacement is most effective and economical. Kiln drying kills larvae within infested lumber, but reinfestation is possible.

Furniture

Fumigation may be necessary to control a powderpost beetle infestation. There are no over-the-counter fumigants available to the public, so working with a pest control company that has the ability
to fumigate pieces of furniture will be necessary. Not all structural pest control professionals are certified to do fumigation treatments, which can be very hazardous and require specialized training. Because fumigation is done with a poisonous gas, the piece of furniture or wooden item must be removed to a secure location to do this safely. Treating unfinished wood surfaces with a borate treatment or residual insecticide may control the infestation somewhat, but will not be as effective as fumigation.

**Extensive Infestations**

If large areas of wood are infested and cannot be removed, the method for 100 percent control would be a structural fumigation. This involves working with a pest control company that has the capability of tenting the home (or parts of the home) and introducing a gas fumigant that will penetrate the infested wood. A second, less effective option would be to treat the wood using a borate or residual insecticide. Wood that is stained or painted cannot be surface treated unless the finish is sanded off and removed.

**Conclusion**

If you think you have a wood boring beetle problem, professional service is recommended. The pest and the situation must both be taken into consideration with respect to selecting an appropriate control measure.

**Proper Identification**

Wood boring beetles can be very difficult to control. Proper identification is the first step in controlling any pest, including wood boring beetles. When it comes to wood-boring beetles, you may or may not have a serious problem, and you won't know, until the pest is properly identified.