

# Your Guide To POWDERPOST BEETLES

## About the Author

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## PCT Media Group

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# Understanding Powderpost Beetles

*How to diagnose problems and develop a prudent plan for customers.* ▶ BY MICHAEL F. POTTER

Powderpost beetles are second only to termites in their threat to seasoned wood. Yet the pests still cause a lot of confusion. The chaos often starts with holes and powder appearing in flooring, cabinets or furniture. Other times, the damage is discovered during a routine wood-destroying insect inspection. Before you arrive, the customer may have already received incorrect information about whether the culprits are indeed powderpost beetles. Mistakes also are made determining if infestations are active, and if so, how they should be managed. This study guide will help you make better decisions when you encounter these pests.

**The Culprits.** "Powderpost beetle" is a term used to describe several species of small ( $\frac{1}{8}$ - $\frac{3}{4}$  inch long) insects that reduce wood to a flour-like powder. The larvae make narrow, meandering tunnels in wood as they feed (Figure 1).



Figure 1. Powderpost beetles tunnel through wood, producing fine powder and small exit holes.

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Figure 2. Lyctid powderpost beetles. The powder is the consistency of flour.

Newly emerged adults mate and lay eggs on or below the surface of raw, unfinished wood. The eggs hatch into larvae that tunnel within the wood, emerging as adults, months to years later. Infestations are usually discovered after noticing powder, accompanied by small, round ‘shot holes’ in the wood surface. These are exit holes where adult beetles have chewed out of the wood after completing their development. Because the adults are active mainly at night, customers are more likely to see holes and powder than the beetles themselves. Occasionally a beetle may be spotted emerging from an exit hole or on a windowsill, since some are attracted to light.

The three most destructive groups of powderpost beetles are the *lyctids*, *anobiids*, and *bostrichids*. Each group contains several species capable of damaging wood materials. Many similar-looking beetles that do not infest wood also appear in buildings. Correct identification is important to avoid embarrassing, costly, and potentially litigious mistakes (see sidebar, ‘Mistaken Identities’).

**Lyctid powderpost beetles** are small ( $\frac{1}{16}$ – $\frac{1}{4}$  inch), narrow and elongated, reddish-brown to black beetles (Figure 2). Their emergence holes are round and about the size of a pinhead. The powdery dust feels like flour or fine talc and often accumulates in small piles near

the holes. Lyctids attack only wood products manufactured from hardwoods such as oak, ash, walnut, hickory, poplar or cherry. Consequently, problems typically arise in floors, cabinetry, molding, paneling and furniture. Tropical hardwoods (mahogany, obeche, bamboo, etc.) are especially prone to infestation due to poor storage and drying practices before importation.

Lyctid powderpost beetles do not infest pine and other softwoods, so structural wood members are generally immune from attack. This is important to communicate to customers, who often worry that infestations will spread into walls, studs, etc. Lyctids also avoid construction plywood used for sub-floors and sheathing (although plywood with a hardwood veneer may sustain damage to the outer layer).

After emergence and mating, lyctids locate susceptible wood to lay their eggs. Ten to 50 eggs per female are inserted into the tiny pores and vessels of unfinished hardwoods. Stained, varnished, or painted surfaces are immune from attack; beetles already within infested wood, however, can emerge through subsequently finished surfaces. Before depositing eggs, female lyctid beetles ‘test’ the suitability of wood for the larvae, which require starches and sugars for development. If the starch content of the wood is insuf-

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ficient (less than about 3%), the females will not use it for egg laying. Lower starch levels also make it harder for the larvae to complete their development. Lyctids are less particular about moisture than other types of powderpost beetles. Larvae can persist in wood with a moisture content as low as about 8%, which is common in temperature-controlled, indoor environments. However, at such low moisture levels, beetles develop more slowly, as occurs in older wood with declining starch content.

In newly seasoned wood with abundant starch and other nutrients, egg to adult development takes less than a year. Conversely, as wood ages, starch content declines and development slows to the point where some beetles may not emerge for two or more years, if at all. *Consequently, lyctid infestations eventually cease and die off even without intervention — an important factor when weighing options* (see section, 'Remedying Infestations'). Small numbers of lyctid beetles already in the wood may continue to emerge for up to five years, in rare cases, even a bit longer. Customers should be apprised of this possibility, and that the prolonged emergence is due to diminished suitability of the wood rather than re-infestation by other beetles.

**Bostrichid powderpost beetles** vary in size depending on the species. Those most associated with wood products are reddish-brown to black ranging in length from  $\frac{1}{8}$ - $\frac{1}{4}$  inch. Compared to lyctids, bostrichids are less narrow-bodied and flattened, and the head is oriented downward, appearing 'hooded' (Figure 3). Many species also have tiny, rasp-like bumps behind the head, sometimes accompanied by a pair of projecting spines at the end of the body. Bostrichids create circular  $\frac{1}{8}$ - $\frac{1}{4}$  inch holes in wood like other powderpost beetles. Female beetles have the



Figure 3. Bostrichid powderpost beetles often have rasp-like bumps behind the head. Some species also have a pair of projecting spines at the end of the body.

unusual habit of boring directly into wood in order to lay eggs. These holes are devoid of powder. Conversely, holes formed by beetles upon completing their development are packed with powder. The powder/frass is more meal-like than lyctid powder and tends to remain tightly packed in the holes and feeding galleries of the larvae.

Bostrichid powderpost beetles are more serious pests of hardwood than softwood, and there is little risk to structural framing within homes. Similar to lyctids, bostrichids usually attack newly processed wood with high starch and moisture content. Tropical hardwoods, including bamboo, are especially prone to attack, which often occurs before importation. Like lyctids, bostrichids seldom re-infest wood after the first generation emerges. Nonetheless, extensive damage

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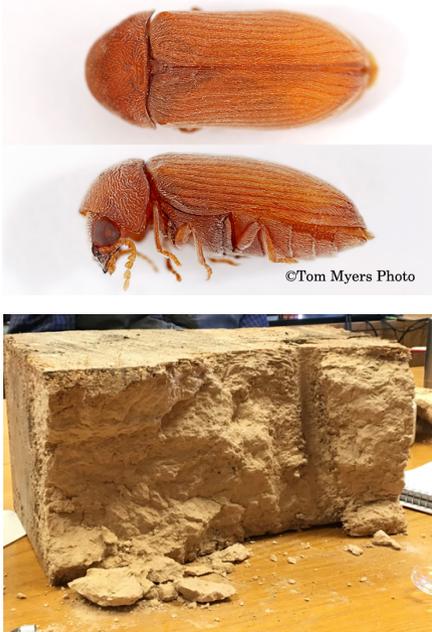


Figure 4. Anobiid powderpost beetles can re-infest damp wood repeatedly. Massive damage to this beam occurred in a bourbon warehouse in Kentucky.

can occur the first year due to a high initial population and rapid development.

**Anobiid powderpost beetles** are convex, reddish to dark brown beetles capable of attacking both hardwoods and softwoods (Figure 4). They are sometimes confused with drugstore and cigarette beetles that also occur in homes but infest stored foods. The emergence holes are  $\frac{1}{16}$ - $\frac{1}{8}$  inch. Rubbed between the fingers, the powder feels gritty (although when the source is oak or another hardwood this is not the case). Unlike the groups discussed previously, anobiid powderpost beetles can seriously damage beams, joists, and other structural components of buildings. Moisture is the most crucial factor affecting the destructive potential of this beetle. Anobiids prefer

to infest moist wood; a 13-30% moisture content is required for development of the larvae. Besides needing wood moisture for larval development, high humidity is essential for egg hatch. At 65-95% relative humidity, more than 80% of eggs successfully hatch; below 60% humidity, hatch is reduced to zero. Consequently, infestations are most severe in damp crawl spaces, basements, garages, and unheated outbuildings. Buildings with central heating and cooling seldom have sufficient dampness to support beetle development in living areas or attics.

Anobiids occur throughout much of the country. Structural infestations are more common in the southeastern and coastal states where humidity and temperature are high and crawl space construction is abundant. Unlike lyctids and bostrichids, anobiid powderpost beetles can digest the cellulose within wood, and are less dependent on starch and other nutrients that decline over time. This enables them to attack and infest wood regardless of age. In Europe, for example, some anobiid species continue to infest wood in buildings that are centuries old. Larval development occurs slowly, exceeding 2-3 years if conditions are suboptimal. As a result, infestations are seldom obvious in buildings less than 10 years old. Although damage occurs slowly, the ability of emerging beetles to re-infest wood year after year can lead to serious problems requiring treatment and repair.

Emergence of adults usually occurs during spring and summer. In nature, the beetles dwell in dead tree limbs or bark-free trunk scars. The adults are strong fliers and some are attracted to lights. Infestations within buildings may originate from infested lumber, firewood, or from beetles entering from outdoors.

**Is the Infestation Active?** Powderpost beetle infestations often die out of their own accord.

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Therefore, it is important to know whether the infestation is active before taking action. Active infestations usually have powder the color of freshly sawn wood streaming from or accumulating near exit holes. Old, abandoned holes will have no accompanying powder and will have taken on the aged appearance of the surrounding wood (Figure 5). If wood surfaces were previously stained, old emergence holes will have traces of stain or finish inside, whereas more recent holes will not. The same may be true of holes that are 'angled,' suggesting beetle emergence occurred before the wood pieces were cut. If accumulations of powder appear yellowed, caked, or covered with dust or debris, the damage probably is old. Careful observation may be necessary to distinguish new powder from powder dislodged out of old larval galleries by vibrations.

Another way to confirm that an infestation is active is to mark or seal any holes, sweep or vacuum up all existing powder, and recheck the wood for new holes and powder later on. Since beetle emergence often occurs in spring or summer, it is useful to wait until then to determine if new holes and fresh powder are present. This makes particular sense when trying to determine whether an infestation is active during colder months of the year.

**Remedying Infestations.** As noted previously, powderpost beetles, especially lyctids and bostrichids, typically enter buildings in lumber or manufactured items (flooring, cabinetry, molding, paneling, furniture, etc.). Infestation occurs after logs are sawn into lumber and the wood sits in storage, or during transit and distribution. Therefore, it is prudent for fabricators and installers to inspect incoming materials for signs of beetles before turning them into finished products. Wood that is suspect should not be used, especially if emergence holes or powder is present. Some of the most serious infestations occur from using old lumber from a barn or woodpile to panel a room, lay a floor, or build an addition.

Customers should know there are options for remedying infestations. Choosing the 'best' approach depends on such factors as extent of damage, potential for re-infestation, and cost — both financial and emotional — to the parties involved. Wood-boring beetle damage occurs slowly. A 'wait and see' approach often makes sense, especially when it is unclear whether the infestation is active.

There are various reasons why some powderpost beetles, especially lyctids and bostrichids, have a hard time re-infesting



Figure 5. Active versus inactive infestations. The former usually have fresh powder accompanying the emergence holes.

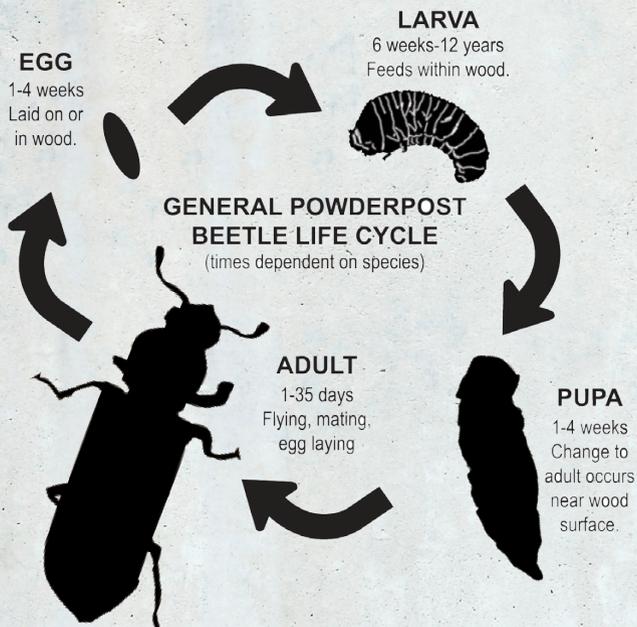
# KNOW YOUR

# ENEMY



**Be prepared!** Beetle infestations are sneaky—most aren't discovered until they're already well established!

While any insecticide will kill the wood-boring beetles it comes into contact with, Bora-Care® penetrates to kill insects that can't be seen or detected. Once the wood is treated with Bora-Care, it's no longer a food source and wood-boring beetles can't infest it. Bora-Care provides residual protection for the life of the wood.



**For more information about wood-boring beetles, see [www.woodboringbeetles.com](http://www.woodboringbeetles.com).**

# WOOD-BORING BEETLES: THE #2 WOOD DESTROYING INSECT



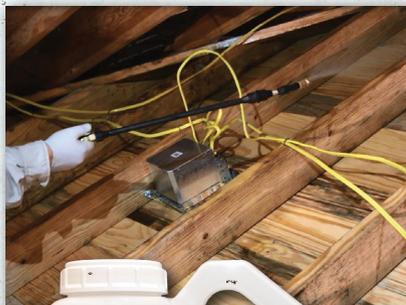
## Identify the problem

1. Examine exit holes. There will be frass the color of freshly cut wood in an active infestation.
2. Confirm an active infestation by marking pinholes and rechecking wood for new holes later.
3. Listen for a chewing noise that older larvae may make during feeding.



## Identify the beetle

1. Lyctidae - True powderpost
2. Ptinidae (Anobiidae) - Furniture & deathwatch
3. Cerambycidae - Old house borer
4. Bostrichidae: False powderpost



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Figure 6. Replacing small sections of damaged wood can be an effective means of control.

wood products within dwellings. As wood ages, levels of starch, moisture, and other nutrients decline to the point where the pests can no longer complete their development. The declining number of adult beetles that do manage to emerge have a hard time finding mates. Propagation and spread are further diminished because most interior surfaces are finished — once stain, varnish, etc., is applied, wood surfaces are no longer suitable for laying eggs. Beetles emerging through such coatings were in the wood before the finish was applied. Although undersides of floors, cabinets, and furniture remain unfinished, declining starch and moisture makes re-infestation via these areas unlikely. The same is true of any beetles attempting to lay eggs in former emergence holes; sealing the holes further prevents this possibility.

**Wood Replacement** — Oftentimes, indications of beetle activity are limited to small sections or a few pieces of wood. The most efficient approach is often to remove and replace them (Figure 6). As an added precaution, it may be prudent to also replace wood pieces adjacent to any that are damaged since larval tunneling sometimes extends from one piece to the next. Beetle holes in any wood that was not replaced should be sealed and all visible wood powder removed so that old damage will not be mistaken for new. Arrangements can then be made with the client to inspect annually for a few more years to ensure activity has ceased. Although it cannot be forecast precisely when no more emergence will occur, future damage should be diminished. If additional holes do appear, an agreement can be made between the respective parties (seller, installer, etc.) to cover the cost of additional wood replacement.

**Moisture Reduction** — Anobiid powderpost beetles in particular have high moisture needs for survival. A wood moisture content below about 15% and relative humidity

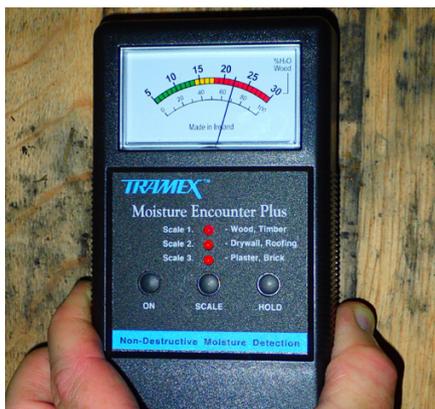


Figure 7. Moisture meters are useful tools for predicting potential re-infestation.

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below 60% during spring and summer is generally unsuitable for development. Therefore, it's advisable to lower dampness in crawlspaces, basements, etc., by installing a vapor barrier, increasing ventilation/air circulation, and improving drainage. Moisture meters are invaluable for measuring the moisture content of wood and predicting the potential for sustained infestation (Figure 7). Hand-held relative humidity meters also are useful tools for predicting viability of anobiid eggs in crawlspaces.

**Residual Insecticides** — Borate insecticides such as Bora-Care and Tim-bor are especially useful against powderpost beetles. They are safe, non-staining, and often retain their protective properties for the serviceable life of the wood. Depth of penetration into wood depends on moisture content; the damper the wood, the deeper they generally penetrate. At lower wood moisture levels (e.g., 10-15%, effective concentrations of borate penetrate only about  $\frac{1}{8}$ - $\frac{1}{4}$  inch — still sufficient to kill newly hatched larvae before they tunnel more deeply, thus breaking the cycle of reinfestation. Wood surfaces must be unfinished since the spray will not penetrate water-repellent coatings. For this reason, borate insecticides are most suited for treating joists, beams, and other structural members. Borate sprays are sometimes used to treat beetle-infested flooring, but the floor must be sanded to raw wood first. Apart from the expense and disruption, such measures are seldom necessary since the emerging beetles (typically lyctids) are unlikely to re-infest. Furthermore, since the moisture content of flooring in temperature-controlled buildings is low (typically below 10%), borate penetration would be minimal and likely would have little effect on larvae already within the flooring.

**Lethal Temperatures** — Before wood is used for construction or manufacturing, most of the water is removed by air-drying or kiln drying. Kiln-dried lumber is heated for a period of hours to about 125-140°F. This is sufficient to kill all stages of powderpost beetles and other insects that might be in the wood prior to heating. However, even wood that is properly kiln dried may become infested during subsequent storage and transit. The longer wood sits in a vulnerable condition, the greater the chance beetles will find and lay eggs on the lumber.

In recent years, some pest managers have begun heat-treating dwellings and furnishings for bed bugs. While it would be difficult to kill wood-boring beetles in built-in components like floors and cabinets, de-infestation of furniture and similar items may be possible within a heat chamber. Temperatures targeting powderpost beetles would be similar to those used for bed bugs (120-135°F), although exposure times might need to be lengthened up to 24 hours depending on wood thickness.

Powderpost beetles also can be killed by placing smaller items like woodcarvings and picture frames in a deep freeze (0°F minimum) for at least one week. Freezers capable of reaching -20°F are able to kill all life stages within 72 hours.

Before freezing, items should be placed in plastic bags, or wrapped in polyethylene sheeting and sealed with tape. This prevents frost and ice from forming on objects during chilling, and condensation after removal. After freezing, objects should be allowed to return to room temperature (for about 24 hours) before being unwrapped or further handled. Some items become brittle at low temperatures, and this will help to reduce breakage.

**Fumigation** — Fumigation is generally an extreme measure for ridding dwellings of

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powderpost beetles. Current fumigants containing sulfuryl fluoride are less effective on wood-boring beetles than former compounds (e.g., methyl bromide). Consequently, de-infestation may not be successful. Structural fumigation may be warranted when anobiid beetle infestations have spread into walls, between floors, and other areas where access for surface treatment or wood removal is impractical. The best way to avoid such problems is early detection and employment of other corrective measures. Portable items such as furniture can be fumigated more efficiently and economically in trailers, vaults, etc.

**Who's Responsible?** Common questions in powderpost beetle investigations are “how did the problem originate — and more pointedly — who is responsible?” Such questions have particular relevance to manufactured products like furniture, flooring and cabinetry. Lyctid and bostrichid powderpost beetles usually start emerging from such items within a year of installation or purchase. In almost all cases, the wood contained eggs or larvae at the time it was brought into the dwelling. This is significant because responsibility for treatment or replacement often resides with the manufacturer, supplier, or installer, rather than the homeowner.

While lyctids and bostrichids sometimes infest firewood, this seldom has anything to do with infestations in dwellings. Also unlikely is that the problem originated from beetles flying in from outdoors. With such infestations, materials with the most beetle holes and powder are the most likely source of introduction. For example, if most of the holes and powder are in cabinetry, it is doubtful the wood flooring was primarily involved.

It is often hard to determine where and

when materials became infected before installation. Generally, the longer wood sits in a vulnerable state during processing, drying, distribution and storage, the greater the chance beetles will find and lay eggs on the lumber. Consequently, wood suppliers often have more culpability for such problems than installers do — especially when materials were installed over a comparatively brief period. Manufacturers and suppliers often assume (incorrectly) that their wood products could not possibly have contained live beetles when sold because the wood had formerly been kiln dried. Although proper kiln drying is sufficient to kill all stages of insects, such wood can become infested during subsequent distribution and storage. Consequently, blanket assertions by wood suppliers that their materials could not contain live beetles because it was kiln dried are invalid.

**Final Thoughts.** Powderpost beetle infestations can be confusing and stressful. It is important to diagnose the problem correctly to avoid unneeded effort and expense. Identifying the beetle involved and whether the infestation is active are crucial first steps. Other factors include the extent of infestation, and type, age, and moisture content of the wood. Since beetle damage progresses slowly, take time to educate the parties involved and develop a plan of action. Extremes such as removing an entire floor or fumigating the building are seldom necessary.

Customers sometimes have concerns that powderpost beetles will harm the future resale value of their home. Since infestations rarely perpetuate indefinitely, this should not be a big concern. Many more homes have been treated for termites and have retained their market value, and powderpost beetles are even less threatening. ■

## Mistaken Identities

Many beetles that are not powderpost beetles occur within buildings. It is important to know the difference to avoid confusion and prevent unnecessary treatment and repair. Powderpost beetles are sometimes confused with similar-looking beetles infesting flour, cereal, grains, seeds, nuts, spices or pet food. Consequently, the source is often stored food items in kitchens, pantries, etc. (Figure 8).

Another pest group often mistaken for powderpost beetles scavenge on surface molds associated with damp conditions.

One of the most common is the foreign grain beetle (Figure 9). The beetles are small (about  $\frac{1}{16}$ -inch long), brownish, and abundant, with large numbers often present throughout the dwelling. A

distinguishing feature is the presence of a small projection/knob on each front corner of the shield-like segment behind the head. A microscope or other means of magnification is necessary to see this. Foreign grain beetles are one of a group of beetles that feed on molds and fungi growing on poorly seasoned lumber or wet plaster and wallboard. They often are a problem in newly built homes. When new homes are constructed, microscopic surface molds form on damp wood and sheetrock, which in turn attracts the beetles. In older homes, foreign grain beetles may be associated with plumbing leaks, condensation problems, or poor ventilation. None of the beetles in this category damage wood; once the moisture condition is resolved, the surface molds disappear along with the beetles.



Figure 8. These beetles, thought to be infesting a new floor, were living in a box of dog biscuits.



Figure 9. Foreign grain beetles are often mistaken for powderpost beetles (note the two small 'knobs' just behind the head).

# THE #2 WOOD DESTROYING INSECT

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