

CHAPTER FOUR

Wood Destroying Coleoptera

In this chapter you will learn about the important wood destroying beetles: how to recognize them, their life cycles, the types of wood they attack, and be able to identify the damage they cause.

Beetles (**Order Coleoptera**) comprise the largest order of insects. There are about 1,000,000 species of insects so far described and approximately 330,000 of these are beetles. While most of these are unimportant insects as far as damage to wooden structures is concerned, you will find a number of species that can be quite destructive to structural wood.

Figure 4-1 shows a diagram of an adult beetle with many of its morphologically important features. These external features are important to their identification.

Order *Coleoptera*

Meaning of
Order Name:
Sheath Wings
Type of Mouth
parts: Chewing

1. antenna
2. palps
3. mandible
4. claws
5. head
6. compound eye
7. pronotum
8. femur
9. tibia
10. tarsus
11. spiracle
12. abdomen
13. vein
14. hindwing
15. forewing

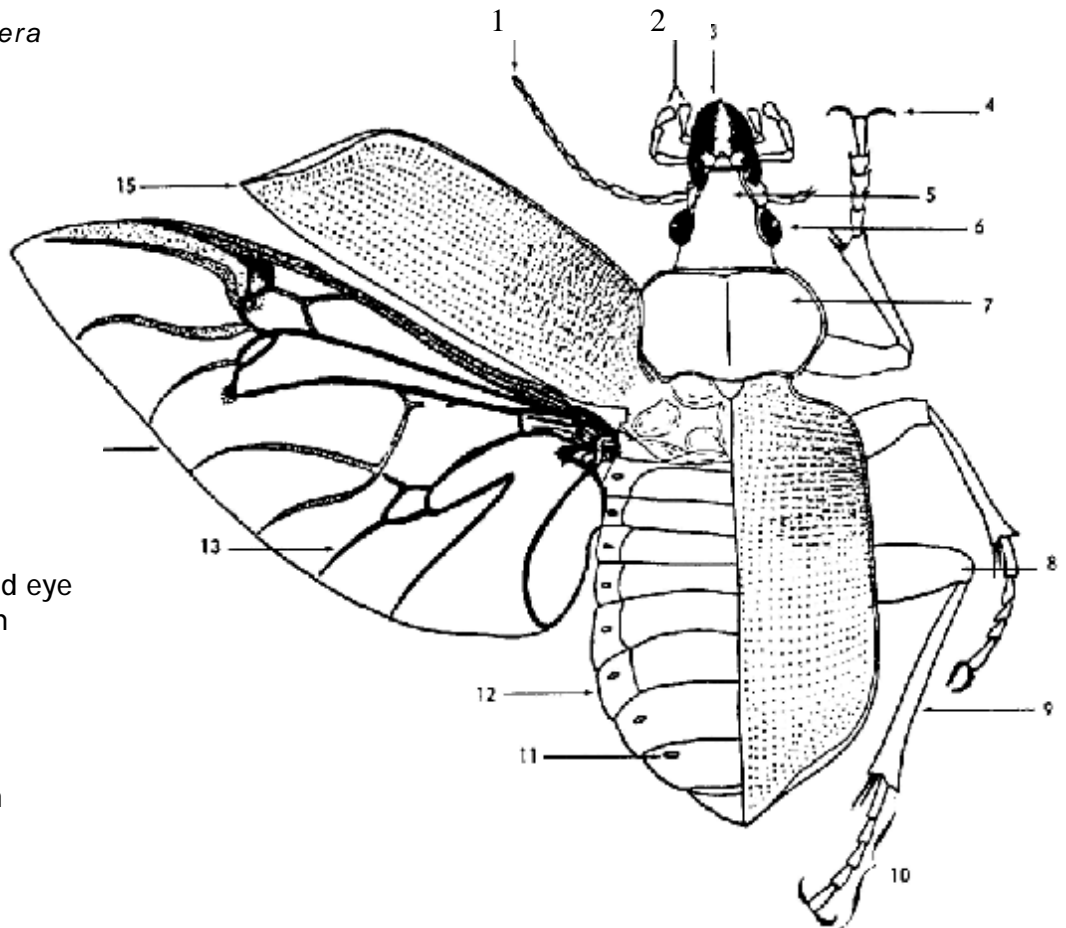


Figure 4 - 1

The most common beetles that you are likely to find in the course of your inspections will be discussed in this chapter. The format for the discussions in this and the following several chapters is as follows:

- Characteristics of the family to which the wood borer belongs
- How to identify the pest.
- Type of wood that is attacked by these organisms.
- Life cycle of the wood destroyer.
- How to inspect for their presence.
- Diagnostic characteristics of the wood that is attacked.
- Will the wood inhabiting organism reinfest?

FLAT-HEADED BORERS



Figure 4 - 2

Family Buprestidae

Beetles in this family are commonly known as flat-headed borers. They take this name from the appearance of their larvae, which have a large and flattened **prothorax** (Figure 4-2). They are also known as metallic wood boring beetles because many of the adults have beautiful metallic-like colors on their wing covers (**elytra**).

There are about 15,000 species world wide, and some 300 from North America. Their larvae attack shrub and trees that are weak, dead or dying. Some will attack newly cut timber. They will not attack structural wood, but they may already be in the lumber prior to construction. They thus will continue to develop and eventually adults will emerge.

Identification

Adult beetles (Figure 4 - 2) are elongated, boat-shaped and somewhat flattened dorsoventrally (from top to bottom). The head is partly retracted into the prothorax as far as the eyes. Their antennae are **serrate** usually with 11 segments. Their tarsal formula is 5-5-5. Many of these beetles are very beautiful having bright iridescent metallic coloration. They are

used as ornamental jewels in many parts of the world. Buprestids range in size from 3/32 inch to 3 inches (2.5 mm - 75 mm). Adults are often sluggish; inactive and will “play dead” when disturbed.

Larval beetles, or grubs, are fleshy, whitish and variable in size. Their prothorax is broadly flattened and much wider than the rest of the body. This is the reason they are called flat-headed borers, even though it is not their head, but their prothorax that is wide and flat. Their legs are either absent or very inconspicuous. Their **spiracles** are crescent shaped.

Type of Wood Attacked:

Flat-headed borers attack both **hardwoods** and **softwoods**. They normally tunnel into sapwood, but may occasionally enter heartwood if the sapwood has begun to dry out. New, unseasoned wood is attacked.

Life Cycle and Development:

Adult females deposit their eggs in crevices or cracks in the bark of trees, the young hatch and tunnel into the sapwood. Their development lasts from one to two years. They may feed on both sapwood as well as heartwood. If infested timber is used structurally their life cycle could be is greatly increased: up to 25 years!

Larvae pupate near the wood’s surface and hatching adults eat their way to the outside. Adults usually emerge from early spring to early fall. However, the time of adult emergence varies according to the species location. The golden buprestid (*Buprestis aurulenta*) (see Figure 4-3) emerges within buildings from late fall through late spring.

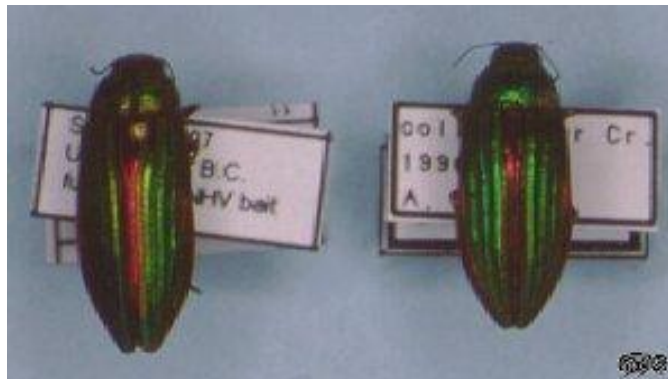


Figure 4 - 3

Inspecting for Buprestids

“Flat-headed” borers are not common in structures, but since they might be found you should be able to recognize them or their exit holes.

- Look for live or dead adults in webs, on window sills, or on floors, or -



- Examine wood for exit holes that are irregular in shape [figure 4 – 4]

Figure 4 – 4

Diagnostic Characteristics of Wood:

Exit holes are **broadly oval to almost rectangular** and measure from 1/8 to 1/2". Their galleries are broadly oval, almost flattened, with frass tightly packed within. The frass is sawdust like and can contain pellets. Ripple-like grooves can be seen on the walls of the tunnels much like those of the round-headed borers.

Reinfestation Within Structures:

Buprestids do not reinfest structural wood.

WHARF BORERS

Family Oedemeridae

Only one species of the 1000 species contained in this family is of concern to the inspector. This is the wharf borer (*Nacertes melanura*). This insect is believed to have originated in Europe but is now widespread in the United States, it has a world-wide distribution. Wharf borer larvae are commonly found in wharf timbers, along coastal areas where they live in wood that is greatly decayed due to being constantly wet and where decay fungi have attacked it. They are most often found in wood buried below buildings, but have been found in wood above grade, if it is very wet.

Identification:

Adult wharf borers range in size from 1/4" to slightly over 1/2" (7 - 14 mm). They have yellowish brown wing covers (elytra) which are black at their tips. Fine yellowish hairs are also present on the wing covers. Their antennae are about half as long as their bodies. Males have 12 antennal segments; females have 11. The width across the base (posterior) of the pronotum is narrower than the base of the elytra. Tarsal formula is usually 5,5,4. The **larvae**, which are always in the damp and decaying wood, are about three times as long as the adults. They are a gray-white color and have small spines on the top of the three thoracic and first two abdominal segments. They have three pairs of well-developed thoracic legs and protuberances on the underside of the 3rd and 4th abdominal segments. (fig. 4-5)



Figure 4 - 5

Type of Wood Attacked:

Vulnerable wood is constantly damp and greatly decayed. Normally this type of condition is found in construction wood that is buried, such as wharf pilings. It is rare to find wharf borers in wood that is above grade, but sometimes wood above ground is so constantly damp that it is attacked by these beetles. It is believed both hard and soft woods are utilized by larval wharf borers.

Life Cycle:

Eggs are deposited on suitable wood which is usually buried somewhere beneath the structure. The wood must be damp or "soggy" to be of interest to the larvae. The amount of damage done to the wood by the larvae is of little importance since the wood is already in the decayed state. Pupation occurs in the wood. Adult beetles emerge, mate and deposit their eggs on the decaying wood. They then leave the ground and come up into building. They emerge each year from April to July during the daytime. Since they have already deposited their eggs below ground, killing them has no effect in controlling next year's generation of beetles. Adults feed on nectar and pollen.

Inspecting for Wharf Borers

The wood inspector will not normally see the infested wood since it is usually below the ground. If infested wood is seen above ground it will be quite wet. When seen, the wood will be soft, spongy, and very wet (The moisture content will be above 90%).

Diagnostic Characteristics of Wood:

If you should find infested wood, it will be **very wet**. If you dig into it you should easily find larvae in it. The damaged wood will look **fibrous** and galleries are not constructed by the larvae. The larvae work in spaces that they plug up with long fibers of wood.

Reinfestation Within the Structure:

Sound, dry wood within the building will not be attacked by wharf borers, only "soggy" wood offers an ideal situation for their larvae. Nevertheless the appearance of beetles year after year can be disheartening to the resident. Explain to your client that these beetles will not destroy the wood of his building and that there is very little, if anything, that may be done to control them.

OLD HOUSE BORER

Family Cerambycidae

This is a large family of beetles consisting of over 30,000 world species (11,000 sp. in North America) of which 1200 species are recorded from the United States. These beetles are also known as **round-headed borers**. Most of them feed as larvae on the woody tissue of trees and shrubs. Adult beetles feed on leaves, flowers and fruit. Members of this family attack both softwood and hardwoods; however, the old house borer attacks only soft-woods and is the only member of the family you are likely to encounter that is a structural wood pest.

Cerambycids are also known as **longhorn beetles** since many of them (excluding the old house borer) have very long antennae that are longer than the length of the body.

Cerambycid beetles may be brought into a building with lumber and firewood. When they emerge upon completing their development they are frequently believed to be a threat to the wood in the building, which is not the case, since these beetles will not reinfest the wood from which they emerged.

Only three North American species of round-headed borers are of importance to structural wood inspectors:

1. The new house borer (*Arhopalus productus*). This beetle is found in the western United States and western Canada. It can be found in pines, and firs and other softwoods. It does not normally reinfest since the wood they emerge from becomes too dry to support another generation.. Females oviposit into bark crevices and therefore they do not infest debarked wood. Adult beetles range in length from 1/4" to 1 1/4" (19-32 mm).
2. The flat oak borer (*Smodicum cucujiforme*). This beetle attacks the heartwood of oak.
3. The old house borer (*Hylotrupes bajulus*). This beetle will commonly be encountered by wood inspectors.



Figure 4 - 6

The old house borer came to the United States about 100 years ago. It is now common among the Atlantic states and can be found westward almost to the Mississippi River.

Identification:

The adult old house borer (Fig.4-6) measures from 1/3 to 1 3/4 inch in length (8-20 mm). While this species is classified in the family of “long horned” borers, the antennae of the old house borer is slightly less than 1/2 the length of it’s body. Females are larger than males. A small male can be slightly over 1/3 inch. A large female may reach slightly over 1 inch in length. They are brownish-black in color and slightly flattened. A pair of black raised spots are present on the pronotum surrounded by light gray hairs. This gives the animal an owl-like appearance. On each elytron or fore-wing are four light areas that give the appearance of two light bands which run from side to side across the back. The second or back band is not always visible. Females can be recognized by the top of the last abdominal segment protruding beyond the end of the wing covers.

Mature larvae measure up to 1 1/4 inches (31 mm). They are grayish to ivory white. Their thorax is much broader than the rest of the body and the head is embedded into the prothorax. Their mandibles are very powerful and colored black. While most other cerambycid larvae have a single ocellus (simple eye spot) old house borer larvae have three ocelli on each side of the head near the antennae. These should be visible with a hand lens in older larvae.

Type of Wood Attacked:

Only softwoods are attacked by the old house borer. Pine is preferred over spruce and other softwood because it has a higher protein content. Larvae feed primarily on the sapwood and will only enter the heartwood when the sapwood is destroyed. New wood or unseasoned wood is preferred. Nutritional requirements for the larvae include sugars and starches, but most important to their development is a high concentration of protein. They also digest cellulose without the aid of yeast or protozoans. Apparently they produce the enzyme cellulase, which digests the cellulose.

Wood may be infested in two ways: 1. Lumber already infested with old house borers is used in the construction of the building. 2. The adult beetles can fly and may enter a structure in which they deposit their eggs; usually in this case wood in attics is attacked. Log homes are a common target.

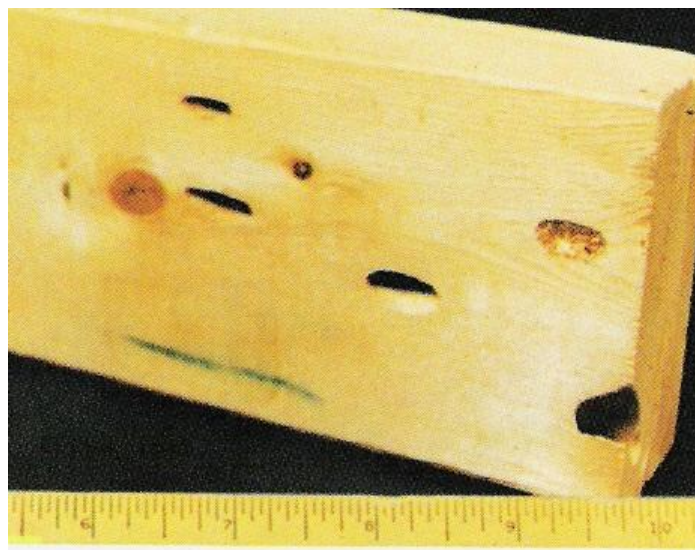


Figure 4 - 7

Life Cycle and Development

Adults emerge in the Northern climates from June through July. In this region the earliest emergence recorded was May 27th and the latest was August 17th. Mating occurs shortly after emergence. Females usually live less than ten days while males can survive up to 15 days. Mated females seek out suitable wood in which to deposit their eggs. She oviposits between two surfaces of wood or in cracks that develop in wood which is drying. These cracks are called "checks". Checks measuring (0.25 mm to 0.6 mm) in width and about 3/4 1" to 1 1/4" (2 to 3 cm) into the wood are suitable for her to oviposit in. Larvae enter the wood shortly after they hatch. They may crawl about on the surface of the wood before entering it. Optimum conditions which will allow the larvae to develop quickly are temperatures from 68 to 88 degrees Fahrenheit (20 to 31 degrees Celsius) with temperatures in the mid 80's best; a moisture content in the wood of 26% to almost 50%; and high concentration of protein in the wood. When environmental conditions are ideal, development can be as short as two years. However, the average length of time for the completion of development is 3-6 years. A record of 32 years has been reported. Larvae already developing in wood where the moisture level falls to 10% will develop very slowly. However, newly hatched larvae usually will not be able to survive this low moisture level.

Attics are often attractive sites for females to lay eggs. The females are attracted to places with high temperatures. However, with the high temperatures continuing, drying will occur and larvae in these situations will have a hard time continuing to develop. Their life cycle will be lengthened greatly and even if they should mature females will not reinfest there.

Inspecting for Old House Borers

- Check all soft wood for the presence of this pest.
- Look for exit holes. These will be about 1/4 of an inch and oval in shape.
- Look for wood powder on floors and on other surfaces.
- Often a clue to the presence of the old house borer is a comment by the resident that they hear noises, usually at night in the walls. Ask the homeowner! These noises are made by the mandibles of the borer as it feeds on the wood. The noises are a clicking or rasping sound. Only nearly mature and the mature larvae (about one inch and 3 1/2 years of age) is are large enough to make audible noises.
- Check spider webs, light fixtures, sills and floors for dead beetles.
- It is very difficult to determine whether or not the damage you see indicates an active or inactive infestation. Pale colored frass around the exit hole may indicated a recent emergence as may frass which continues to fall out from the hole.

Diagnostic Characteristics of Infested Wood:

Only softwoods will be attacked by the old house borer. Their exit holes will be oval shaped and measure from 1/4 to 3/8 of an inch (6 - 10 mm) in diameter (fig. 4-7). Bubbles or bumps may be seen on the 'surface. These bubbles are caused by moisture in the wood wetting the frass in the galleries and causing it to swell.

Galleries will be oval in cross section and contain both powdery frass and blunt pellets. When rubbed between the fingers, it feels gritty. If you clean out some of the frass you should be able to see "ripple - like" markings along the walls of the galleries. These markings are caused by the larva's mandibles, as it feeds on the wood. These ripple marks are clearly visible in Figure 4 – 8. Most of the feeding is done parallel to the grain of the wood. Exit holes may be seen in paneling, dry wall, plaster or even through the flooring. Even though these areas are not softwood, the borers will chew through them in order to escape from the wood in which they developed.



Figure 4 - 8

Reinfestation Within Structures:

The old house borer may continue to reinfest a structure as long as environmental conditions [moisture] are favorable. If the heat or air conditioning in a building has caused the wood to become too dry, or the wood protein content is not high enough, reinfestation will probably not occur.

POWDERPOST BEETLES

There are three families of beetles that may bear the name of “powderpost beetles”. These are the Lyctidae, Bostrichidae and Anobiidae.“

Powderpost beetle” larvae tunnel in the sapwood and over a period of years they can completely reduce the wood to a powder. The family Lyctidae are considered to be the “true” powderpost beetles; the family Bostrichidae are also known as branch-and- twig borers since in nature they attack the branches of dying or dead trees. They are also known as “false powderpost beetles”. The family Anobiidae are sometimes known as furniture beetles or death watch beetles. These names do not really describe all species in the family since only one member of the family (*Anobium punctatum*) has been called the furniture beetle and another (*Xestobium rufovillosum*) is the death watch beetle. The name death watch comes from the belief that “ticking” heard in the still of the night signaled someone sick in the house was about to die. The noise is actually sexual in nature and is the way males and females attract each other. The beetles within the galleries tap their heads on the wood.

The following tables show how the adults, larvae and eggs of these families can be distinguished from each other.

Table 4 - 1: Comparison Between Adult Powderpost Beetles

ANOBIIDAE	BOSTRICHIDAE	LYCTIDAE
Body cylindrical	Body cylindrical	Body compressed
Size 1/8 - 1/3"	1/9 - 1"	1/12 - 1/5"
Head not seen from above. It is hidden beneath the thorax.	Head of most species nearly completely hidden when viewed from above.	Head visible from above.
Antennae not club-like at tip.	Antennae with a loose 3 (rarely 4) segmented club.	Antennae clubbed at tip; club composed of 2 segments. Antennae not serrate.
no spinal protuberances on pronotum	Front of pronotum with spinal protuberances (rasp - like)	No pronotal protuberances.

Table 4 – 2: Comparison Between the Eggs of the Powderpost Beetles

ANOBIIDAE	BOSTRICHIDAE	LYCTIDAE
Eggs round deposited in surface cracks	Natural depressions in the wood or in old exit holes	Eggs long & cylindrical in pores of hardwoods – in galleries.

Table Four - 3 Comparison Between Larval Beetles

ANOBIIDAE	BOSTRICHIDAE	LYCTIDAE
Numerous small hairs covering	Hairs not numerous on body	Hairs not numerous on body
Small spines on the top of the last two segments	Spines lacking from top of segments.	Spines lacking from top of segments.
Eighth abdominal spiracle same size as others.	Eighth abdominal spiracle same size as others.	Eighth abdominal spiracle much larger than others. Front end of body not greatly enlarged.

Front end of body not greatly enlarged.	Front end of body greatly enlarged.	Front end of body like anobiids.
Legs with five segments and clawed.	Legs with less than five segments and clawed.	Legs with three segments and without claws.

BRANCH- AND TWIG-BORERS OR FALSE POWDERPOST BEETLES

Family Bostrichidae

This family consists of about 650 species worldwide with 64 species from North America. They range in size from 1/8" to 2" (3 mm to 52 mm) although those that are found in structures are about 1/8" to 1/4" (3 mm to 6 mm).

Identification:

Adult bostrichids (Fig. 4-9) are easily identified — most are dark brown to black in color; their head is bent downwards and is covered by the prothorax. Thus it is not seen when viewed from above the body. Their antennae are often serrate and the last three or four segments are swollen to form a club.

The dorsal front surface of the prothorax is usually covered with small bumps or; it appears "rasp - like". Tarsal formula = 5-5-5, although the basal or first segment is very small and not always distinct.

The larvae are C-shaped grubs similar to those of the Anobiidae and Lyctidae (see Table Four - one for a comparison between these families). Bostrichids range in length from 1/10" to 2" (2.5 mm-52 mm).

Bostrichid larvae have the thoracic segments greatly enlarged so when you view the grub laterally the front end of the body appears much more swollen than does the back end. The narrowest part of the body is at the fifth abdominal segment. They have relatively few hairs on the dorsal part of their body.



Figure 4 - 9

Type of Wood Attacked:

Most species prefer to oviposit in hardwoods, but some species will utilize softwoods. They are unable to digest cellulose since they have no symbionts to assist them.. They derive their nutrition primarily from starches as well as from proteins and sugars. They are found mostly in the sapwood.

Life Cycle and Development:

Adult females do not deposit their eggs on the wood's surface or into the exit holes. Instead, they bore into the wood, construct a tunnel, mate, and then oviposit into the pores of the wood within this tunnel. Adults feed on the wood as they excavate the tunnels.

Larvae hatch and excavate galleries, feeding with the grain of the wood. They pack their frass tightly behind them as they feed.

The entire life cycle can be less than a year, but more often, up to five years may be required if rapid drying of the wood occurs. There are six larval stages (instars). By the time they pupate their galleries can be about 20 - 24 inches (50-60 mm) long. Newly emerged adults will then bore out of the wood.

Inspecting for Bostrichids

- Look for round exit holes.
- Exit holes will be from 1/32 of an inch to almost 1/4 of an inch.
- Bostrichids can be found in both hard and soft woods, but they most often attack hardwoods.
- Fine to coarse frass may be present issuing from the exit holes.
- Inspect sills, floors spider webs and light fixtures for the presence of dead beetles.

Diagnostic Characteristics of the Wood.

Since the adults enter the wood prior to breeding and the next generation of adults bore out about a year later, the holes you observe on the wood's surface are both entrance and exit holes (fig. 4-10). These holes are round in shape and about 3/32" to 9/32" (2.5-7 mm) in diameter. Frass is not found in the entrance or exit holes but is tightly packed in the galleries. The frass tends to stick together. It thus does not fall continually out of the holes as it does in the case of the anobiids and lyctids.



Figure 4 - 10

Reinfestation Within Structures

It is generally believed that bostrichids will not infest the wood from which they emerge. The authors have seen exceptions to this, however. Some species will also attack stored food products.

TRUE POWDERPOST BEETLES

Family Lyctidae

Sixty-six species of lyctids have been described from the world. There are 10 species found in the United States. The following six species are commonly encountered in the United States:

1. *Lyctus planicollis* The southern Lyctus beetle (southern United States. and Gulf States).

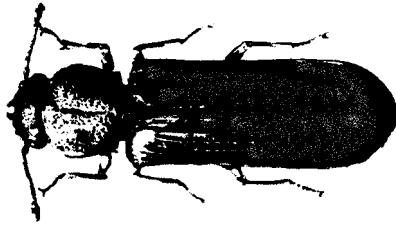


Figure 4 - 11

2. *L. cavicolis* The western lyctus beetle(California and Oregon).
3. *L. brunneus* The brown lyctus beetle (throughout the U.S.).



Figure 4 - 12

4. *L. linearis*. the European lyctus beetle (mostly in the eastern U.S.).
5. *Trogoxylon parallelopedium*. No common name. (throughout the U.S.)

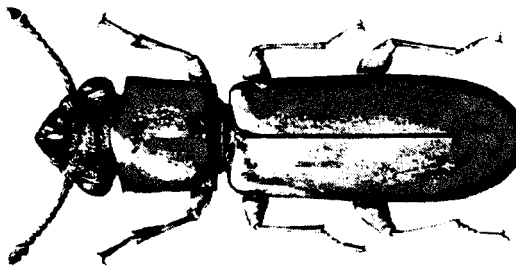


Figure 4 - 13

6. *T. proomoides* has no common name. (District of Colombia and southward to Mexico).

Identification

Adult lyctids are recognized by the following characteristics: Their bodies are somewhat flattened dorsoventrally and elongate. Their lengths range between 3/32" to 7/32" (2 mm to 7.5 mm). Their heads are visible when viewed from above. Their antennae consists of 11 segments of which the last two are swollen to form a club. Body coloration ranges from reddish-brown to brown to black. Their prothorax is almost squared (slightly longer than broad). It is convex on its dorsal surface and bears a median longitudinal depression. Their tarsal segments number five of which the first is very small. Larvae are small less than 3/16" (5 mm). C shaped whitish grubs. They are easily recognized from related beetles by having eight pairs of spiracles on their abdomen, one on each side of the eight abdominal segments. The last one (8th) is much larger in diameter than the preceding spiracles. In addition, the thoracic legs of lyctids are three segmented and bear a claw at their tips.

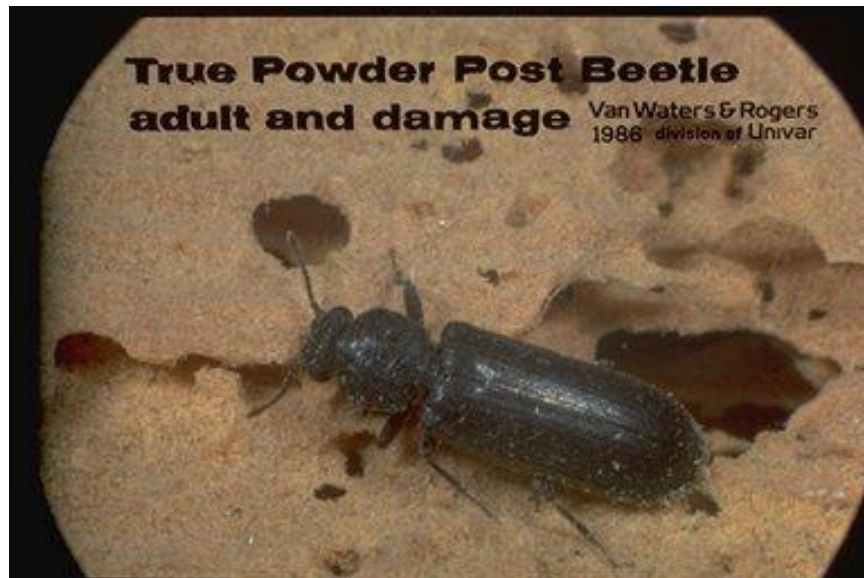


Figure 4 - 14

The eggs of lyctids are quite different from other related families (see Table 4 - 2). They are elongate, about one millimeter long, rounded at their ends and have a thread-like projection at the anterior end.

Type of Wood Attacked

Lyctids oviposit only in hardwoods, since hardwoods have the pores into which the female needs to oviposit. They also have the starches needed by their larvae in order to develop. Since lyctids are unable to digest cellulose they feed primarily on starches, and on some sugars and protein. If the starch content of the wood is less than 3% eggs will not be deposited in it. The moisture level must be above 6%. They prefer moisture levels of from 8 to 32%, therefore they will not attack unseasoned or "green" wood. "Green wood" has a moisture content of 50% or more. As the wood seasons the moisture content will come down to the preferred range.

As the wood ages, the starch content reduces along with the moisture. Therefore, at some point in time the starch level will be so low that the infestation will die out. The plant cells in wood remain alive for a long period of time during which they reduce cellular starch into sugars. A problem is caused if the wood is seasoned too quickly. This can occur if the wood is improperly kiln dried. In this case too high temperatures (over 113 degrees F) will kill the plant cells fixing or preserving the starches within them. Thus this wood, high in starches, remains attractive to lyctids. They will continue to reinfest it indefinitely.

Wood which has been varnished or painted is not suitable for oviposition. The paint coating closes up the pores into which the female inserts her ovipositor.

Life Cycle and Development

Adult female lyctids mate soon after they emerge from the wood. The males often emerge ahead of the females, and are able to locate the positions of pupating females in the wood. They mate with the females immediately upon their emergence. The females then search for suitable wood into which they will then deposit their eggs. As mentioned previously, females will not oviposit into wood that is too low in starch or moisture. A theory exists that the female "tastes" the wood prior to egg laying to determine if the starch level is adequate. Females do bite across the grain of the wood leaving very small grooves. It is now believed that she is cutting across the grain of the wood to open up pores in which to deposit her eggs. She can also deposit them into the pores of cracks (or checks) as well as into the old exit holes. Her ovipositor is very long (about as long as her body) so she is able to deposit eggs deeply within the wood's pores.

Eggs hatch in about 8 days and the larvae tunnel into the wood and deposit frass in their burrows as they eat wood and move forward. When they are ready to pupate they move near to the surface of the wood and construct a pupal chamber. Adults then chew their way out of the wood. Adults generally live from three to six weeks after emergence.

Their entire development can be as short as three months although it normally takes about a year (five years or longer may be required if conditions are not optimal).

Inspecting for Lyctids

- Check all accessible hardwood for their presence.
- Look for small (1/32" to 1/16") round exit holes.
- Check for fine powdery frass that has fallen out of exit holes. Frass will be "smooth" to the touch, without discrete pellets.
- Look for live or dead adult beetles in webs, sills floors and light fixtures.



Figure 4 - 15

Diagnostic Characteristics of Wood

Lyctids are only found in hardwoods. There are two reasons for this: hardwoods are rich in starch (needed by the beetles) and hardwoods contain the vessels or pores through which water and nutrients travel upwards from the roots to the leaves. It is into these vessels or pores that the lyctids deposit their eggs.

Often the first thing that indicates a lyctid infestation is the powdery frass filtering out from the exit holes and piling up on the floor or on objects directly below the exit holes. This frass is very fine, similar to facial powder. It does not contain any pellets and is silky smooth when rubbed between the fingers.

Exit holes are round and measure 1/32" to 1/16" in diameter (.8 mm to 1.6 mm). After many years the surface of the wood will contain numerous exit holes. This is the time when the infestation becomes apparent.

The galleries are almost round in cross section and loosely filled with frass. After many years very little of the wood will remain. Only the exterior surface may be left and no structural strength exists.

Reinfestation Within Structures

True powderpost beetles will continually reinfest wood for many years [figure 4 – 16] as long as it contains the necessary moisture and starch concentrations for their successful development.



Figure 4 - 16

FURNITURE AND DEATH-WATCH BEETLES

Family Anobiidae

The family Anobiidae is represented by the furniture beetle (*Anobium punctatum*) and the deathwatch beetle (*Xestobium rufovillosum*). This is a large family containing about 1600 species in the world, 310 sp. from North America and 260 species are found in the U.S. Most of the anobiids are wood borers, but two species are important pests of stored food products. These are the Drugstore beetle (*Stegobium paniceum*) and Cigarette or Tobacco beetle (*Lasioderma serricorne*). These beetles do not attack wood.

Anobiids, along with the families Bostrichidae and Lyctidae, are often called powderpost beetles since their larvae reduce wood to a powder. However, the family Lyctidae are known as the true powder post beetles because their frass is a true powder similar to talc; the Bostrichids have a coarser frass which includes some small wood fragments while the Anobiids have actual pellets in their frass in addition to the powder.

Identification

Adult Anobiids range in size from 1/8" to 1/4" (3 mm to 7 mm). Their color is from reddish-brown to nearly black. Their heads are bent under the pronotum which is hood-like, covering the head so it is not visible when viewed dorsally (fig. 4-18). Adult anobiids range from elongate to nearly oval. Their antennae usually have the last three segments elongate with the following segments much smaller. Some species have comb-like antennae. The club-like antennae seen in the true powderpost beetles (Lyctidae) or false powderpost beetles (Bostrichidae) are lacking. Tarsal formula= 5-5-5.

Larval Anobiids are C-shaped grubs as are those of the Bostrichids and Lyctids. The differences between the larvae of these three families are shown in Table 4 - 3.

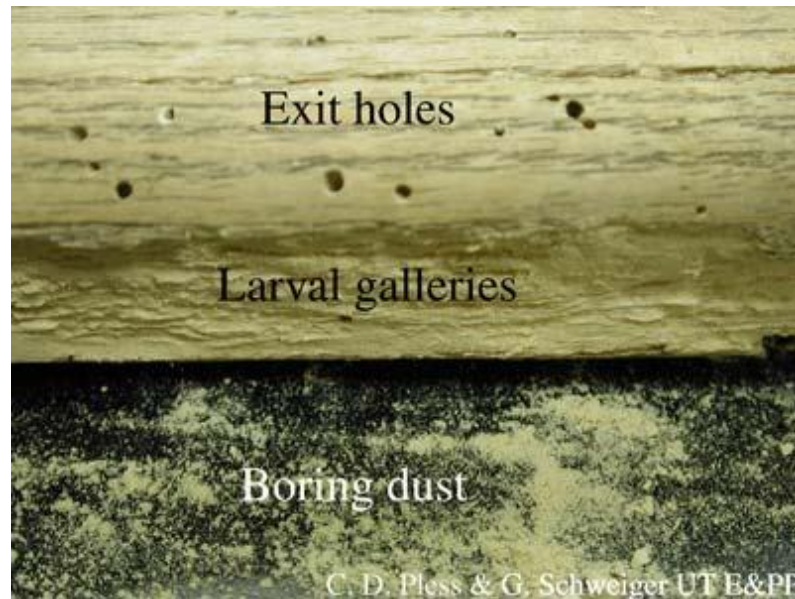


Figure 4 - 17



Figure 4 - 18

Type of Wood Attacked:

Anobiids as a family attack both hardwoods and softwoods. They prefer seasoned wood but some species will attack unseasoned wood as well. Most of their activity is in the sapwood near to the bark; it is here that the food substances they require (protein, starch and sugar) are found. They can also feed on the heartwood nearest the sapwood. Anobiids can digest cellulose. They do not have protozoan symbionts but enlist the aid of yeast cells found within their digestive tracts.

The two common Anobiids, the furniture beetle and the death watch beetle, differ in their wood preferences. The furniture beetle usually attacks softwood which is only a few years old. They will occasionally oviposit in hardwoods. The death watch beetle, on the other hand prefers very old hardwoods but will attack some softwoods. The death watch beetle is so called because males and females will "call" to each other by banging their heads against the wood in which they are located. This behavior usually occurs in the late spring prior to their emergence.

These noises were interpreted by some superstitious persons as foretelling the death of someone who was ill in the household. The most common death watch beetle we have in eastern North America is the eastern death watch beetle (*Hemicoelus carinatus*). This beetle measures 1/6" to 1/4" (4-6 mm) in length, has 10 segments on each antennae, and is reddish brown to dark brown in color. This beetle attacks both hard and soft wood.



Figure 4 - 19

Life Cycle and Development:

Females lay their eggs in the cracks and crevices, open grain, and exit holes of suitable wood as they require a rough surface in which to lay eggs. If the wood is coated with paint or varnish, females will seek out other wood in which to oviposit.

Larvae hatch and bore into the sapwood. When mature they move nearer the wood's surface to pupate. Adults emerge through small round exit holes. The life cycle may be completed within a year but can take up to three or more years depending on the species and environmental conditions.

Usually adults can be seen from April through the summer months. If the moisture content of the wood is 14% or less and if the wood contains a high level of resins and a low concentration of protein the infestation will die out.

Inspecting for Anobiids

- Since both hardwood and softwood may both be attacked by anobiids you will have to check all wood within the building.
- Look for small round shaped exit holes. These can measure from 1/16" to 1/8".
- Inspect for frass coming out of exit holes and accumulating on horizontal surfaces. Frass will feel gritty when you rub it between your fingers. This is due to the presence of pellets within the frass.
- Check for live or dead adults within the building (light fixtures, webs, sills, floors).

Diagnostic Characteristics of Wood

Evidence of an Anobiid problem would be indicated by the small, round exit holes (1/16" to 1/8"; (1.6 - 3 mm) made by the adults. Look for powdery frass both under the wood and coming from the holes that is caught on the wood grain below the holes. If you cut into the galleries look for frass which is powdery and also contains pellets. (figs. 4-17, 4-19) Some species produce bun shaped pellets while others produce elongate pellets

with tapered ends. If you rub the frass between your fingers it will feel gritty. The galleries run in all directions regardless of the grain.

Reinfestation Within Structures

Anobiids will reinfest a structure over a period of years. If starches, proteins and sugars are present the wood will continue to be vulnerable to them. Moisture is, however, an important factor in determining whether the beetles will continue to thrive. If a building has central air conditioning and heating, and does not have a moisture problem the wood can become dried out and the infestation can die out.

While many Anobiids, such as the furniture beetle, are strong fliers, they usually remain in the vicinity of the wood from which they emerged. Thus damage is frequently seen adjacent to the initial place of infestation. It is only after many years that other areas in the room or house are attacked.

AMBROSIA BEETLES

Ambrosia has been called the “food of the Gods”. In the case of certain wood destroying beetles, the term ambrosia refers to a fungus which lines the walls of the galleries constructed by adult beetles. Ambrosia beetles are found in two separate families — the Scolytidae and the Platypodidae.

Family Platypodidae

There are close to 1000 species of platypodids described from the world, seven of which are found in the United States. These beetles are known as pinhole borers, shothole borers as well as ambrosia beetles. They do not feed on wood, but on fungi.

Identification

Adult platypodids range in size from 1/32" to 5/16" (2 mm to 8 mm). They are elongate and cylindrical in shape. Their head is somewhat wider than their pronotum and is visible when viewed from above. Each antenna ends in a one segmented club. Their legs are very characteristic since the first tarsal segment is very long. It is longer than the second through fifth segments combined.



Figure 4 - 20

Type of Wood Attacked

Platypodids are found in forested areas where they normally attack felled trees. They occasionally will attack sick and dying trees as well. Only unseasoned hard and soft woods are attacked. Their galleries can be found deep in the heartwood as well as in sapwood.

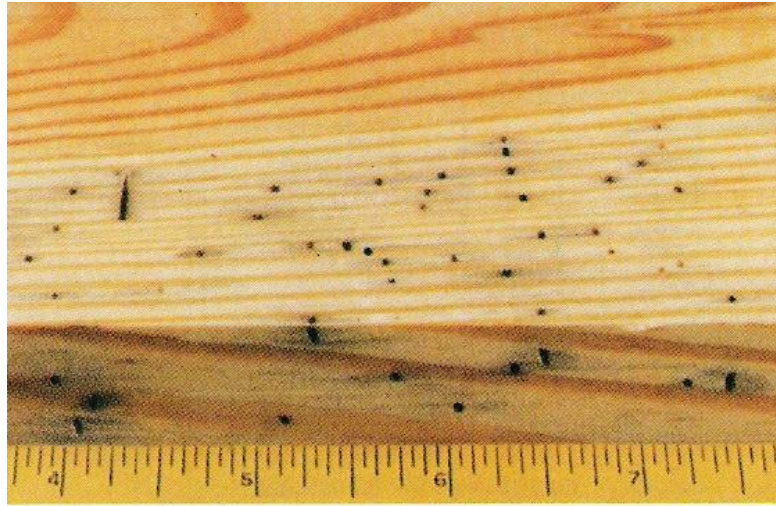


Figure 4 - 21



Figure 4 - 22

Life Cycle and Development

Adult beetles bore into susceptible wood and construct galleries in which they will feed and care for their young. The adults provide the food upon which their larvae will feed. They place wood chips and excretia into the galleries and grow a fungus (ambrosia) on it for their young to eat. The fungus grows and if not eaten fast enough can fill the larval galleries and kill them. The galleries are kept free of excrement (frass) by the adult female beetle. The larvae do not feed on wood. It is only the adults that tunnel into the wood and begin to cultivate the fungi.



Figure 4 - 23

The presence of the fungus causes a staining of the wood on which it is growing. The coloration of the stain will depend on the fungus cultured by the beetles. Some produce a blue, others a brown, purple or black stain.

When the larvae mature they exit the wood through the entrance holes made by their parents.

Their development can take up to two years, however, in tropical areas it may be completed in from six to 16 weeks.

Ambrosia will not live for more than several generations since the wood they are in will lose its moisture at which point their primary food, the fungi, will not continue to grow.

Inspecting for Ambrosia Beetles

- Inspect "new" wood for the presence of exit holes that are round and range from 1/50" to 1/8" diameter. Both softwood and hardwood may have been attacked.
- Since adult beetles and their larvae do not feed on wood, but on fungi there is a lack of frass.
- Galleries, entrance and exit holes will be stained bluish, black or purple from the fungus which grows inside them. (fig. 4-21)

Diagnostic Characteristics of Infested Wood

Platypodid ambrosia beetles are usually seen deeper into the heartwood than are scolytid ambrosia. Their tunnels are almost straight and do not meander about as is the case with the lyctids and anobiids.

Their galleries will be almost free of frass, and numerous dark colored stains will appear throughout the wood. (fig. 4-22)

Entrance holes made by adults are round and about 1/50" to 1/8" (0.5 mm - 3 mm). Their galleries are also rounded in cross section and are the same size as the entrance holes. This is because the adult males and females make the holes as they enter the wood. Their larvae do not construct any tunnels so there is no variety of tunnel sizes.

Reinfestation

Since only unseasoned timber is vulnerable, reinfestation should not occur. The unseasoned timber they attack, has a moisture content of about 30%. This moisture is required by the fungus: it can not grow without it.