STRUCTURAL PESTS/WOOD-DAMAGING PESTS

TERMITES

Termites are regarded as one of the major pests in urban community environments, often dreaded because of their devastating effects on wood in homes and structures. However, they play a vital role by recycling wood and other cellulose-based organic matter and returning it to the soil, enhancing soil structure with their tunneling activities and serving as a food source to a variety of predators in the desert landscape.

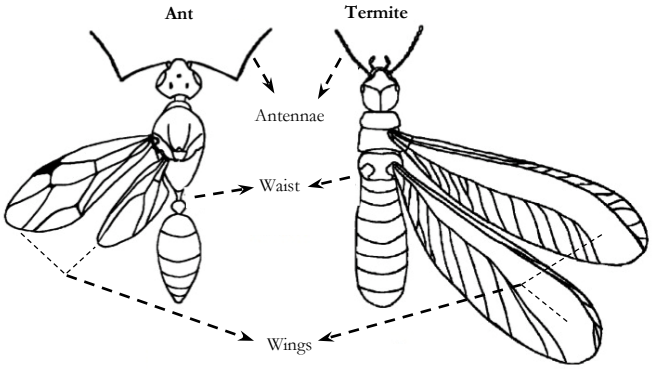
Termites belong to the order Isoptera, the name of which refers to their two pairs of identical wings in the adult winged forms. They are social insects, and live in highly organized colonies or societies containing individuals of different castes, each performing specific functions and varying in their appearance. Their nests are elaborate structures made of different materials including chewed wood, soil, saliva and feces; the composition, size and location of nests vary with the species and their needs. The queens produce many generations and can live for many years.

A typical nest contains a single pair or several 'reproductives', workers and soldiers. The reproductives or 'alates' are often larger than the other castes, and have fully functional eyes and wings, but the wings are shed during their mating flights. Workers and soldiers are wingless and often have poorly developed eyes. Soldiers possess distinct powerful mandibles, often characteristic of a species while some also possess glands to spray defensive fluids against predators. All castes have filamentous antennae that resemble a string of round beads.

During favorable times of the year, usually associated with a rain event, the alates leave the colony in large numbers, often millions. This process is called "swarming" during which pairing takes place. However, only a very small number of alates survive the swarming flight. A newly formed pair shed their wings and move to a location within moist wood or soil where they build a chamber and mating takes place in it. Within weeks, the female (queen) lays eggs, with the first batch developing into workers that perform the various tasks within the colony except reproduction. Specifically, these include caring for the future eggs and young, maintenance of the nest, foraging for food and digestion of cellulose, and even defense. Workers are the most numerous and are the individuals that are most often seen by humans causing structural damage. The soldier caste is primarily charged with defending the colony against intruders such as other termites and ants. The male (king) usually pairs with the queen for life and they can mate several times. After mating the queen's abdomen increases so much in size that she can rarely move freely, and has to be tended to by the workers.

Termites undergo incomplete metamorphosis, and their young closely resemble the adults. Most primitive species of termites digest cellulose with the help of microscopic symbiotic organisms called protists that live within their hindgut. Individuals in a colony exhibit 'trophallaxis' or exchange of gut and rectal contents, which allows efficient use of nutrients and transfer of gut symbionts, as well as recognition of colony members and distribution of chemicals involved in caste regulation.

Termites are sometimes referred to as "white ants" because of their resemblance to ants, and winged ants are often mistaken for winged termites. However, several characteristics can be seen with the naked eye that can help differentiate the two insects. Ants have two pairs of transparent wings of unequal size, while termites have four equal-sized wings that generally fold over the back. In addition, ants have a narrow "waist" behind their wings, but the abdomen is completely straight in termites. The antennae of ants are elbowed, whereas the antennae of termites are straight and filamentous.



Diagrammatic representation of differences between winged ants and termites
Source: University of Hawaii Termite Project

Termites are broadly classified into three categories based on their habitat: drywood, dampwood and subterranean. They can also be grouped based on their scientific classification (families). The following sections follow a combination of both methods.

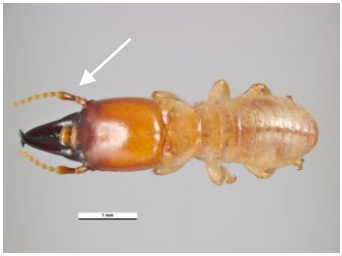
NOTABLE SPECIES

Incisitermes minor alates
Photo: Ansell Oommen

Common name(s): Drywood termite
Scientific name, classification: Different species, **Order:** Isoptera, **Family:** Kalotermitidae. The western drywood termite, *Incisitermes minor* and the light western drywood termite, *Marginitermes hubbardi* are species of concern in the southwest.
The so-called desert dampwood termite *Paraneotermes simplicicornis* belonging to the same family (Kalotermitidae) is not a typical drywood termite and infests damp wood in contact with soil.
Distribution: Southwest U.S. and other areas with Mediterranean climate.
Description and ID characters: Drywood termites are larger than subterranean termites, but smaller than dampwood termites, and derive their common name from their habit of infesting dry wood. Alates can measure about 1 inch in length with wings, ½ inch without.

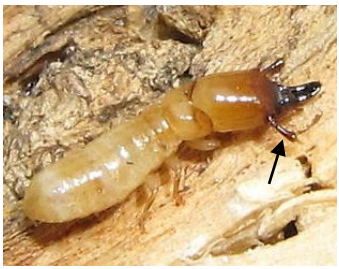
Best identifying features:

Western drywood termite alates have a reddish-orange-brown head and thorax and two-toned, dark brown to black abdomen and smoky dark wings. Soldiers are larger than the alates, with a large orange-brown head with dark pointed mandibles, with two teeth visible on the left mandible and the third antennal segment is enlarged. The body is light brown in color. Workers are white in color.



Incisitermes minor soldier
Photo: Pest and Disease Image Library

Light western drywood termite alates are lighter in color and their soldiers have a club-like third antennal segment that is almost as long as all the succeeding segments combined. Habits and habitats of both species are very similar, but the latter can tolerate drier conditions and higher temperatures.



Marginitermes hubbardi soldier
Photo: Eric R. Eaton

First indirect signs of infestation are fecal pellets or the presence of alates on windowsills or near lights. Alates found inside the house (if windows and doors have been closed), are an indication of infestation within the structure. Another indication of infestation is the presence of discarded wings on windowsills or caught up in cobwebs.

The presence of alates outdoors is a natural phenomenon and is not an implication of home infestation by any termite species.

Fecal pellets are distinctive and diagnostic of a drywood termite infestation. They are hard, elongated and less than $^{1}/_{25}$ inch long. They have rounded ends and six flattened or concavely depressed sides. The characteristic shape results when the termite exerts pressure on the fecal material to extract and conserve moisture in its hindgut. Typically the pellets take on the color of the food source, and can be white, light brown, tan or black. Infested wood will produce a dull or hollow sound when tapped. Careful probing of wood with a sharp instrument may reveal galleries. The interior of infested wood contains chambers connected by galleries or tunnels that cut **across the wood grain**. The galleries have a smooth, sculptured appearance and contain few if any fecal pellets. Accumulations of pellets sometimes may be found in blind galleries or unused tunnels. Drywood termite infestations often go unnoticed because they are located deep inside the wood, and are mostly discovered during repair or maintenance work. Presence of fecal pellets alone does not indicate an active

Western drywood termite damage
Photo: Dawn Gouge

infestation. If pellets in a spot are removed and new ones appear in a few days, an active infestation may be present.

Pest status: Important structural pest.

Damage/injury: Drywood termites attack all types of dry sound wood including structural lumber, dead limbs on trees, utility poles, decks, fences, lumber in storage, and furniture. They are capable of infesting dry, sound wood that is not in contact with the ground.

Sign of western drywood termite damage
Photo: Kevin (ibkev2002)

Dead trees, branches, brush and firewood from residential areas are the primary habitat. When land is cleared and houses or other buildings constructed, these structures are then subject to attack. Alates periodically swarm from infested wood to infest additional nearby wood. Drywood termites enter structures through attic or foundation vents, directly through or under wood shingles, under eaves and fascia boards, and through natural cracks, checks and joints in exposed wood trim, window and door frames and sills. They can penetrate flat wood surfaces, but prefer to wedge themselves into narrow places to begin tunneling.

Western drywood termite damage
Photo: Whitney Cranshaw

Life history: Swarming occurs during the day, from May to early September, and they are not timed to coincide with the rain, as in subterranean termites. Alates flying from the colony travel varying distances. They are weak fliers but can be carried long distances by air currents. Drywood termites are not affected by monsoons.

A colony consists of offspring from an original pair (male and female), soldiers and immatures. There is no true worker caste. 'False workers' occur, which are capable of becoming soldiers or alates as needed. Immatures perform some of the worker duties such as gathering food and caring for the queen, the younger immatures and the colony.

Colonies are small compared to other termite species (a few thousand individuals), and slow in development. It may take years for a colony to manifest itself. Drywood termites spend their entire lives feeding and tunneling inside wood and do not build mud tubes. They construct round "kick holes" in infested wood, through which the fecal pellets are eliminated from the galleries or tunnels and alates will emerge. These pellets accumulate in small piles below the kick holes, or will be scattered if the distance between the kick hole and the surface below is very great. The appearance of fecal pellets often coincides with swarming.

Western drywood termite fecal pellets
Photo: Whitney Cranshaw, Bugwood.org

Moisture is not as important to drywood termites as it is to subterranean termites. Drywood termites require no contact with the soil or with any other source of moisture. They extract water from the wood on which they feed, and also produce water internally during the digestive process. They prefer wood with 10 percent moisture content but require as little as 2.5 to 3 percent moisture.

Common name(s): Desert dampwood termite
Scientific name, classification: *Paraneotermes simplicicornis*, **Order:** Isoptera, **Family:** Kalotermitidae.
Distribution: Southwest U.S.
Description and ID characters: These termites are not typical drywood or dampwood termites but rather, subterranean-drywood termites that attack wood that is in contact or buried in soil, or other damp, weakened wood.
Best identifying features: Alates have dark brown bodies and wings. Soldiers are ½ to ¾ inch in length and are brown or yellowish brown with low flat heads. Their mandibles are relatively short and much wider at the base than at the tips. The third antennal segment is not enlarged in this species. Immatures (which are also workers) have distinctive spotted abdomens.
Wood damaged by desert dampwood termites shows large, open and irregular tunnels filled with fecal pellets. The fecal pellets are smoother and moister than typical drywood termite fecal pellets because of their moister habitats.


Desert dampwood termite damage to post
Photo: USDA-FS

Pest status: Minor pest of wood and structures.
Damage/injury: Attack living or partially-living desert shrubs and young trees, utilizing their sap for moisture. They can be pests of young citrus trees and grapevines, by girdling the plants below the soil line. They can also attack structural lumber that has high moisture content such as near a water-leak, or other continually damp wooden structures. Infestations can extend into sound dry wood several meters away from the moisture source, but once the remote source of moisture is removed, the colony will gradually decline and succumb to desiccation.
Life history: Desert dampwood termite colonies are typically small, containing up to 1,500 individuals. Swarming is not strictly dependent on rains, but usually occur during dusk following a rain event during the summer monsoons. A newly formed pair will start a colony in a suitable site in moist wood. In arid areas, desert dampwood termites locate moist wood below the ground and nest in and around it. The colony gradually extends into the soil, sometimes killing living plants by destroying their roots.

Common name(s): Dampwood termite
Scientific name, classification: *Zootermopsis* spp., **Order:** Isoptera, **Family:** Termopsidae.
The only real dampwood termite species found in desert areas of the southwest is the so-called Arizona dampwood termite *Zootermopsis laticeps*. Other species such as the Pacific dampwood termite *Zootermopsis angusticollis*, the Nevada dampwood termite *Z. nevadensis* are also encountered in some locations.
The so-called desert dampwood termite *Paraneotermes simplicicornis* (family Kalotermitidae) is not a real dampwood termite but is a subterranean-drywood termite that attacks wood that is in contact or buried in soil (see section above entitled 'Desert dampwood termite').


Pacific dampwood termites-various castes
Photo: Andrew Meeds

Distribution: Western U.S. In the desert southwest, found in cooler, humid areas along the coast, in forests or higher elevations.

Description and ID characters:
Individuals of *Zootermopsis* spp. are the largest termites in the U.S., and are much larger in size than corresponding individuals of drywood and subterranean termites. Alates may reach over 2 inches, soldiers about 1 ½ inches and workers and immatures about ¾ to 1 inch in length.


Pacific dampwood termites and fecal pellets
Photo: Adam Blake

Best identifying features: *Zootermopsis* spp. alates are yellowish brown, with dark brown wings. Soldiers have large, two-toned heads that are black towards the front and reddish-brown towards the body, and have long, black-toothed mandibles. The abdomen is light-brown or caramel colored. Workers have yellowish-brown bodies, with slightly darker heads and dark brown or black mandibles.
Dampwood and drywood termites can be mistaken for each other because they nest in wood and do not require contact with the soil. However, appearance and preference for wood with high moisture content can help to identify dampwood termites. Typically, dampwood termites infest large pieces of wood that are in contact with, or buried in soil.


Dampwood termite gallery with high moisture. Note fecal pellets dissolving to form a muddy paste. Photo: Lynette Schimming

Wood damaged by dampwood termites shows large numbers of large, open and irregular tunnels that vary greatly in shape and size. Fecal pellets are found throughout the tunnels. Individual pellets are about $^{1}/_{25}$ inch long, hard, smooth and elongated oval in shape like a football. Color varies with the type of wood consumed. They do not have the characteristic ridges and grooves seen in drywood termite fecal pellets, but are hexagonal in cross section. The pellets often lose their shape because of the moist conditions in the galleries, and form clumps or even a muddy paste if there is too much moisture. In drier wood, the pellets collect within the galleries, and may also be expelled out of the wood.

Pacific dampwood termite damage.
Photo: Kevin Lentz

As with drywood termites, presence of fecal pellets alone does not indicate an active infestation. If pellets in a spot are removed and new ones appear in a few days, an active infestation may be present. Due to their preference for high moisture, the presence of dampwood termites is an indicator of water leaks or wood decay in a structure.

Pest status: Structural pest of low concern, can spread wood decaying fungi.

Damage/injury: Dampwood termites attack a wide variety of wood in their habitat, with a strong preference for moist, decaying wood that is mostly of little use to humans. However, they can occasionally be a nuisance when they attack baseboards or other moist wood around homes and structures. Moist timbers such as untreated posts, poles and fences can be attacked at or below ground level. Dampwood termites are well adapted to high moisture levels and can even colonize wood that is in prolonged contact with water. However, they occur less frequently in the desert southwest and their damage is less problematic as compared to drywood or subterranean termites. Once correctly diagnosed, the problems they cause can best be handled by correcting moisture problems (e.g., water leaks in roofs and decks) and replacing damaged wood.

Life history: Dampwood termite colonies are typically small, containing up to 4,000 individuals comprising of the king, queen, workers, soldiers, immatures and eggs. Swarming can occur year-round, primarily during warm humid evenings. A newly formed pair will start a colony in a suitable site in moist wood.

Common name(s): Subterranean termite
Scientific name, classification: Different species, **Order:** Isoptera, **Family:** Rhinotermitidae. The arid-land subterranean termite *Reticulitermes tibialis*, and the so-called desert termite *Heterotermes aureus* are important species of concern in the southwest. The tube-building termite *Gnathamitermes perplexus* is common in outdoor environments and not a significant concern. The Formosan subterranean termite *Coptotermes formosanus* is a potential threat.

Reticulitermes tibialis alates
Photo: Eric R. Eaton

Distribution: Worldwide. In the southwest U.S., they would be a potential problem in coastal communities rather than desert areas.

Heterotermes aureus soldiers and workers
Photo: Alexander J. Yelich, Univ. of Arizona

Description and ID characters: Subterranean termites derive their common name from their habit of living in contact with soil, mostly under the soil surface. Individuals are generally smaller than drywood and dampwood termites, the alates measuring about 1 inch in length with wings, about ¾ inch without.

Best identifying features: Alates range in color from dark brown to black, (arid-land termites), or pale yellowish brown (desert termites), with dark legs and smoky gray or light brown wings. Soldiers are slightly larger than adults in body size, light-brown or caramel colored with long, narrow reddish-brown heads and nearly straight mandibles. Workers are smaller than alates and soldiers, light brown or cream colored. Soldiers and workers lack wings and eyes. Tube-building termite alates are about ¾ inch long including the wings. They have a dark brown head and thorax and the abdomen is distinctive with alternating dark brown and cream colored bands. Soldiers have sub-rectangular heads that are nearly as broad as long, antennae are dark towards the tips, and mandibles are as long or longer than the head, nearly straight, but curved inward at the tip, with an obvious inner tooth. This tooth is used to distinguish this species from other desert termites. Identification of subterranean termites using soldiers or alates is difficult and magnification is necessary for species level confirmation. Signs of infestation might also help with identification.

The most common signs of a subterranean termite infestation are their mud tubes or **shelter tubes**, visible damage to wood in the form of blisters or dark, sunken areas, and swarms of alates. Shelter tubes are constructed by the workers using soil and other debris mixed with their saliva. They are built for different purposes, and often break open easily upon touch, revealing live workers and soldiers moving within. Wood damaged by subterranean termites is usually thin at the surface, which sinks in with the slightest pressure. Excavating such wood with a thin, sharp

implement such as a knife and finding live termites within is a sure sign of an active infestation.

Subterranean termite damage
Photo: Jim Kalisch, UNL Entomology

Feeding in wood by subterranean termites is in the form of hollow, completely enclosed, longitudinal cavities generally **along the grain of wood**. This pattern alone is often used to distinguish subterranean termite damage from others. The softer springwood is mostly damaged, while the harder, less digestible summerwood is left intact.

Pest status: Important structural pest.

Damage/injury: Subterranean termites are by far the most common and the most destructive termites in the arid southwest. In their natural habitat, they attack various kinds of woody material, including roots and stems of desert trees and bushes, cactus ribs, and other desert plants. When homes and other structures are built in these settings and their natural food sources are removed, they begin to attack the structures causing considerable economic damage. Although they prefer dead and moist wood, they are widely known to consume dry, sound wood as well as other materials that contain cellulose such as paper, cardboard and fabric. Around homes and structures, damage is commonly noticed on utility poles and posts, structural timbers such as floors, beams and rafters. Subterranean termites nest below the soil surface, but can enter structures through wood that is in direct contact with soil, or by building shelter tubes. Any material directly connecting a structure to the soil, including trees, vines or plumbing fixtures, can serve as a pathway to infestation. Subterranean termites have been reported to chew through foam insulation boards, plaster, drywall, thin lead and copper sheeting, and even asphalt in an attempt to reach food sources. They are known to spread wood decaying fungi.


Extensive damage to wooden structure by subterranean termites
Photo: USDA Forest Service

Among the different southwestern species, *H. aureus* is considered the most important in terms of economic damage, being less restricted by higher temperatures and lower moisture. Their shelter tubes are strong and solidly constructed, circular in cross-section and are lighter in color due to being reinforced by their light yellow feces. Although a serious economic structural pest, damage by *R. tibialis* is considered less severe because they are less persistent in building tubes and mostly attacks moist, weakened wood. The shelter tubes of *R. tibialis* are flatter, less solid and dark brown in color. The invasive *C. formosanus* is a serious economic pest in many parts of the world. It is notorious for its huge colonies and rapid rate of consumption of wood. It is mostly found in isolated

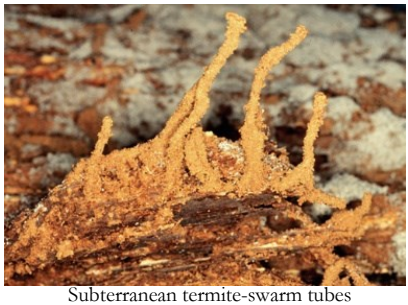
locations in the arid southwest with a potential to spread to more areas, currently being more of a problem in the southeast, including Texas. The tube-building *G. perplexus* are not considered serious pests. They usually build their tubes around fallen wood, cholla stumps or other plant material in the soil and are not commonly encountered inside a structure.

Tube-building termite shelter tubes
Photo: Michael J. Plagens

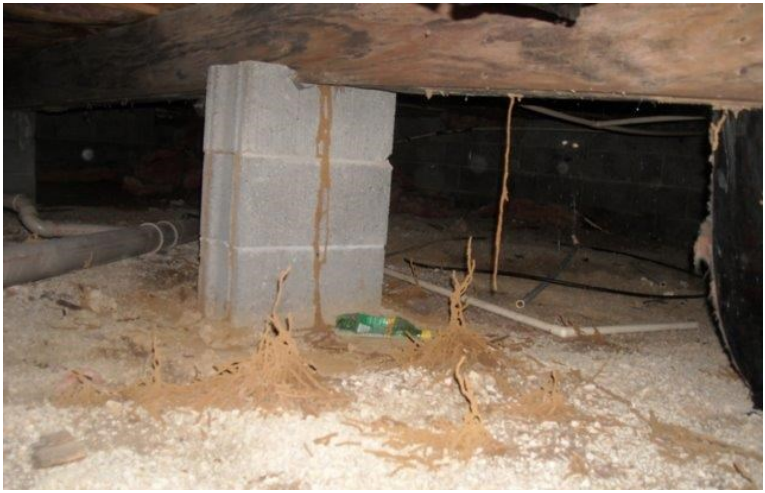
Life history: New colonies are typically started by an initial pair of alates after swarming, but can also be established by division of an existing colony called "budding". Swarming times vary with species, but are usually occur at dusk following rains. Established colonies usually contain thousands of individuals, including the primary king and queen, large numbers of workers, soldiers, immatures and eggs. The workers do most of the work within the nest, including feeding other individuals that are unable to feed themselves.

Subterranean termites are essentially dependent on moisture and therefore nest in or near soil, or maintain a connection with soil through shelter tubes. Soil serves as a source of moisture that protects them from desiccation, shields them from predators, and can be used as a building material for their shelter tubes and nests. Generally, four types of shelter tubes are built: **working tubes** from the soil to wooden structures, often crossing barriers such as concrete or stone foundations; **exploratory and migratory tubes** arising from the soil but not connecting to wooden structures; **drop tubes** extending from wooden structures back to the soil; and **swarm tubes** for new alates to fly out of during swarming.

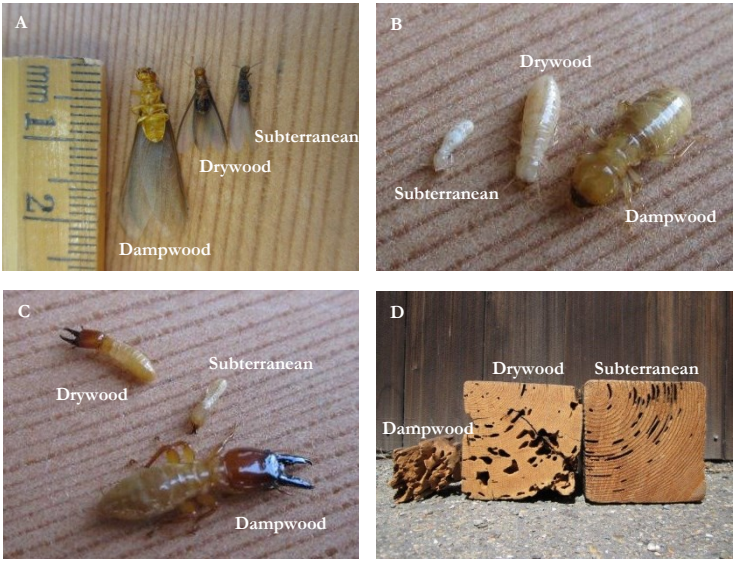
Subterranean termite-working tubes
Photo: USDA-Forest Service



Subterranean termite-swarm tubes
Photo: Dini Miller, VirginiaTech Extn.



Subterranean termite-different kinds of shelter tubes in a basement
Photo: Larry Ralph Jr., www.indiancrawlspacerepair.com



General comparison of drywood, dampwood and subterranean termites;
A-alates, B-workers, C-soldiers and D-damage.
Photos: Robin L. Tabuchi, University of California Berkeley

WOOD-DAMAGING BEETLES

Common name(s): Common furniture beetle
Scientific name, classification: *Anobium punctatum*, **Order:** Coleoptera, **Family:** Anobiidae.
Distribution: Worldwide.
Description and ID characters: Minute cylindrical, dark brown or black beetles, about ¼ inch in length, with an elongated oval outline.


Common furniture beetle
Photo: © Entomart

Best identifying features: Resemblance to cigarette and drugstore beetles, with their elongated, cylindrical rounded bodies, but are longer than both, darker in color, with a pronounced hump or upward projection on their pronotum, resembling a dark hood. The elytra have lengthwise rows of minute punctures. The entire body is covered with minute, fine hairs.
Larvae are minute, creamy white, plump 'C' shaped, grubs about ⅛ inch in length. The first signs of their presence are numerous small holes, about ⅛ inch in diameter on wooden structures, and emergence of fine, powder-like wood particles from these holes that drop in small piles on to floors, furniture or the ground.
Pest status: Occasional pest of wooden furniture and other wooden structures within and around homes and buildings.
Damage/injury: Most of the damage is by the larvae that bore into wood forming long tunnels. Feeding by the larvae produces the fine wood powder, which sometimes overflows and falls out of the holes on the surface of the wood. The larvae can tunnel extensively within the wood, causing it to weaken and disintegrate or collapse if unnoticed for a long time.


Furniture beetle tunneling in wood
Photo: Kai-Martin Knaak

Furniture beetles prefer woods with a high moisture content. They are therefore more common in basements, crawlspaces, or damp areas of homes or buildings.
Life history: Adults usually emerge from pupation in late spring. Eggs are laid directly on the wood surface, in natural pores or cracks. Larvae bore into the wood and can spend months, sometimes years in the larval stage, feeding and boring through the internal structure along the grain. Larvae nearing pupation move to the surface of the wood, or near exit holes. Pupation takes place within the wood tunnels, and adults emerge breaking through the wood surface creating new exit holes, or exit through previous ones. New adults may re-infest the same wood, or fly away and infest new wood.

Common name(s): Deathwatch beetle, anobiid beetle
Scientific name, classification: Different species, **Order:** Coleoptera, **Family:** Anobiidae. The Pacific deathwatch beetle *Hemicoelus gibbicollis* is a common southwestern species. These beetles are also referred to as powderpost beetles.
Distribution: Worldwide.
Description and ID characters: Minute rounded, reddish brown, dark brown or black beetles, about ¼ inch in length, with an elongated oval outline.
Best identifying features: Resemblance to cigarette and drugstore beetles, with their elongated but rounded bodies. Pronotum is enlarged, humped and covers the head like a hood. Head is pointed downwards and is covered by the thorax when viewed from the top. Antennae end in a 3-segmented club.


Deathwatch beetle
Photo: Pest and Disease Image Library

Larvae are creamy white, plump 'C' shaped, grubs with 3 short legs on the thorax. They are larger than other powderpost beetle larvae, and up to ½ inch in length. The body is enlarged towards the head, narrows in the middle, and again enlarges to form a bulbous tail end.
The first signs of their presence are numerous small holes of varying diameter, usually varying from $^{1}/_{16}$ - ⅛ inch, on wooden structures, and emergence of fine, powder-like frass (wood particles mixed with fecal material) from these holes that drop in small piles on to floors, furniture or the ground. The powder produced by death-watch beetles appears fine, but contains some coarse particles. It is intermediate in size and consistency to powders produced by powderpost and false powderpost beetles.
Pest status: Occasional pest of wood and wooden structures within and around homes and buildings.
Damage/injury: Most of the damage is by the larvae that bore into wood forming long tunnels. Feeding by the larvae produces the fine wood powder, which is tightly packed within their tunnels inside the wood, but sometimes overflows and falls out of the holes on the surface of the wood. The powder is so tightly packed in the tunnels that the wood surface sometimes gets a blistered or uneven appearance. The larvae can tunnel extensively within the wood, causing it to weaken and disintegrate or collapse if unnoticed for a long time. Different kinds of wood and wooden structures are attacked, including floors, window and door frames and sills, rafters and beams, stair rails, furniture, etc. Infestations indoors are almost always from outdoor


Deathwatch beetle exit holes in wood. Note uneven sizes of holes.
Photo: Kai-Martin Knaak

populations from natural wooded areas, where the beetles infest weak and dying trees.
Deathwatch beetles have a preference for soft woods such as fir, or old, weak or decayed wood, especially those with a high moisture content. They are therefore more common in basements, crawlspaces, or damp areas of homes or buildings.
Life history: Adults usually emerge from pupation in late spring. Eggs are laid directly on the wood surface, in natural pores or cracks. Larvae bore into the wood and can spend months, sometimes years in the larval stage, feeding and boring through the internal structure. Pupation takes place within the wood tunnels, and adults emerge breaking through the wood surface creating new exit holes, or exit through previous ones. Sometimes, overwintering takes place as pupae, and adults do not emerge till the next spring. New adults may re-infest the same wood, or fly away and infest new wood.
Deathwatch beetles get their name from the tapping sounds produced by adults to communicate with each other. These sounds can be heard from infested wood when the surroundings are quiet. They were often noticed in olden times, when people kept quiet vigil near someone who was nearing death, and were thought of as the ticking of time for the dying person.

Common name(s): Powderpost beetle
Scientific name, classification: Different species, **Order:** Coleoptera, **Family:** Bostrichidae, subfamily Lyctinae. The western lyctus beetle *Lyctus cavicollis* is common in the southwest. A similar and related group are the false powderpost beetles belonging to the same family, but other subfamilies. The lead cable borer *Scobicia declivis* is a common species in the southwest.
The term 'powderpost beetle' may also refer to similar wood-boring beetles of other families that bore into wood and produce fine, powder-like wood particles by their activities.


Western lyctus beetle
Photo: Pest and Disease Image Library


Lyctus beetle head and antenna
Photo: Pest and Disease Image Library

Lead cable borer head and antenna
Photo: Pest and Disease Image Library

Distribution: Worldwide.
Description and ID characters: Minute reddish brown, dark brown or black beetles, about ⅛ to ¼ inch in length.
Best identifying features:
Powderpost beetles or 'true powderpost beetles' have a smaller thorax, making the top of their heads visible when viewed from above. Their antennae end in 2-segmented clubs.
False powderpost beetles have a large thorax often with a hump, which covers the head when viewed from above. The head points downwards and is located below the thorax. The thorax often has distinct horns, warts or other raised processes. Antennae end in 3-segmented clubs.
Larvae of both species are creamy white, plump 'C' shaped, legless grubs about ¼ inch in length, slightly broader and more rounded at the head-end with a small dark head.
The first signs of their presence are numerous small holes, mostly of uniform diameter (about $^{1}/_{16}$ inch) on wooden structures, and emergence of fine, powder-like frass (wood particles mixed with fecal material) from these holes that drop in small piles on to floors, furniture or the ground. The powder produced by powderpost beetles is extremely fine and uniform, and appears like talcum powder or refined flour, whereas false powderpost beetles produce a much coarser powder that is gritty to the touch, and is less frequently found piled outside their tunnels because it is packed so tightly into the galleries. The powder produced by a similar wood-boring beetle, the death-watch beetle, is intermediate in size and consistency to both of these.
Pest status: Occasional pest of wood and wooden structures within and around homes and buildings.
Damage/injury: The adult beetles lay eggs into natural cracks or pores on wood, and the larvae bore into the wood forming long tunnels. Feeding by the larvae produces


Lead cable borer, a false powderpost beetle
Photo: Pest and Disease Image Library


Powderpost beetle larvae
Photo: USDA Forest Service


Powderpost beetle damage
Photo: InArc Design, www.inarc.ie


Powderpost beetle damage below surface
Photo: Western Australia Dept. of Ag.

the fine wood powder, which is tightly packed within their tunnels inside the wood, but sometimes overflows and falls out of the holes on the surface of the wood. The powder is so tightly packed in the tunnels that the wood surface sometimes gets a blistered or uneven appearance. The larvae can tunnel extensively within the wood, causing it to weaken and disintegrate or collapse if unnoticed for a long time. Different kinds of wood and wooden structures are attacked, including floors, window and door frames and sills, rafters and beams, stair rails, furniture, etc. In natural wooded areas they infest weak and dying trees, and can be brought into a home or building through infested wood in furniture, structural timbers, or wooden pallets that contain shipments.

Powderpost beetles prefer very hard and dry woods, with high starch content and low moisture. Hardwoods such as mahogany, walnut, oak, ash and hickory; and bamboos are their preferred food sources, and these woods also have natural pores in which they can lay their eggs.

False powderpost beetles attack both hard and soft woods, as well as bamboo. Some of these beetles are also known to bore through non-wood materials such as plaster, and soft metals such as lead, silver and aluminum. They are often called 'lead cable borers' because they are found to bore through telephone or electric cable coverings. Another common name they have earned is 'cask borer', because of their habit of boring into wine-soaked wooden barrels, casks and corks.

Life history: Eggs are laid directly on the preferred wood, sometimes in natural pores or depressions in the wood, or other injuries or cracks on the surface, or in the case of false powderpost beetles, in a tunnel below the wood surface. Larvae bore into the wood and can spend months, sometimes years in the larval stage, feeding and boring through the internal structure. True powderpost beetle tunnels are filled loosely with the wood powder produced during the tunneling, which is pushed out and falls in small piles when the adults exit the tunnels. False powderpost beetle tunnels are packed tightly with the powder, which is difficult to dislodge from the tunnels. Pupation takes place within the wood tunnels, and adults emerge breaking through the wood surface creating new exit holes, or exit through previous ones. If conditions are favorable, female beetles lay their eggs in the same wood, and the infestation continues for several generations. Some females fly away and infest new wood.

Common name(s): Carpenter ant, Western carpenter ant.
Scientific name, classification: *Camponotus modoc*, Order: Hymenoptera, Family Formicidae. Other species of carpenter ants found in the desert southwest include *C. vicinus*, *C. herculeanus*, *C. noveboracensis* and *C. essigi*.
(See section on ants for detailed description).

Common name(s): Carpenter bee
Scientific name, classification: *Xylocopa* spp., **Order:** Hymenoptera, **Family:** Apidae. The California carpenter bee *Xylocopa californica* is a common southwestern species. (See section on bees for detailed description).

The presence of frass, wood powder or shavings on or near wooden structures or articles may not be indicative of an active infestation of any wood-damaging pest. In many cases, the infestation may die out naturally by the death of the insects, or by their movement to other spots. If the infestation is not active, the holes will take on a weathered appearance and any fallen powder gets blown away or covered with dust, or other debris. Active infestations can be identified by fairly continuous streaming of powder from the holes on the wood. If one or few holes are sealed and the powder removed, fresh ones will appear in an active infestation.
The sizes of the holes made on the wood surfaces and the frass (wood powder) produced are helpful to distinguish between these pests. A method that is sometimes used to identify powderpost beetle damage is by the 'ballpoint pen test', but it should not be considered conclusive. Only the tip of a "click-type" ballpoint pen refill will fit into a hole made by true powderpost beetles; whereas the entire point of the refill may fit into a false powderpost beetle hole but they are usually packed tightly with frass and are difficult to pierce into. The point of the refill and some of the angled part of the pen would fit into a deathwatch beetle hole. Powderpost beetles produce extremely fine and uniform powder resembling talcum powder or refined flour, whereas false powderpost beetles produce a coarser powder that is gritty to the touch. Deathwatch beetles produce an intermediate-textured powder that is mostly smooth, but with some gritty particles.

True powderpost beetle frass (left); deathwatch beetle frass (right)
Photo: Robin L. Tabuchi, University of California, Berkeley

Western drywood termite fecal pellets
Photo: Kevin (ibkev2002)

Closer view of drywood termite fecal pellets
Photo: Dawn Gouge

All these are different from the drywood termite pellets, which are much larger and have ridges and grooves on their surface. They are also different from carpenter ant or carpenter bee frass. Carpenter ant damage produces fine wood shavings that are pushed out of their tunnels along with their fallen or shed body parts. Carpenter bees produce coarse sawdust-like particles which are often mixed with their feces and pollen.


Carpenter ant damage produces piles of wood shavings (left)-Photo: Edward H. Holsten;
Closer view of wood shavings mixed with ant body parts and other debris (right)- Photo: NY State IPM, Cornell


Carpenter bee damage-note the neat circular hole with fecal stains outside (left)-Photo: Tony Alter;
Wood shavings mixed with pollen and other debris, seen below the hole (right)- Photo: PixOnTrax

Sources, further information:

Arizona termites of economic importance
http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1369.pdf
Drywood termites
http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1232.pdf
Powderpost beetles
http://ohiowood.osu.edu/images/Powderpost_Beetles.pdf
Structure-infesting wood-boring beetles
https://insects.tamu.edu/extension/publications/epubs/e-394.cfm
Subterranean and other termites
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7415.html
Termite management for homeowners
http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1356.pdf
Wood-destroying pests
http://www.ipm.ucdavis.edu/PMG/menu.house.html#DESTROY