

Bark Beetles:

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A Field Guide to Diseases & Insect Pests of Northern & Central Rocky Mountain Conifers



Spruce Beetle From page 54

Dendroctonus rufipennis (Kirby)

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Hosts-- Engelmann spruce, Colorado blue spruce, rarely lodgepole pine.

Distribution-- Range of host in Idaho, Montana, Utah and Wyoming.

Damage-- Larvae and adults feed in phloem layer of inner bark. Completely girdled trees are killed; however, strip attacks (successful attacks that do not kill the tree) may be made. Tree is inoculated with blue stain fungi. Trees less than 12 inches d.b.h. are infrequently attacked.

Identification-- Look for red-brown boring dust on bark, in bark crevices, and on ground around base of tree from mid-May to July (fig. 64). During the winter, woodpeckers will flake off bark that accumulates on the ground or snow around infested trees. Egg galleries average 3 - 12 inches in length, have a slight crook at the start, and extend upward in standing trees. Eggs are deposited on alternate sides of the gallery which is packed with frass (fig. 65). Larvae feed in the phloem, usually gregariously, often forming fan-shaped galleries. Larvae are present for two summers, pupate, then over winter the second year as adults beneath the bark. In standing trees, adults briefly emerge in their second fall and reenter the tree, to overwinter beneath the bark at the root collar where they have protection from snow. Infested trees usually do not turn yellow-green until 1 year after attack. Adult beetles are dark brown to black with reddish-brown wing covers and are about one-fourth inch long.

Similar Damage-- Secondary bark beetles may produce boring dust. Gallery patterns distinguish them from the spruce beetle.



Figure 64. Red-brown boring dust in lower bark crevices and around tree base is a sign of spruce beetle attack.



Figure 63. Bark flaking by woodpeckers is a good indication of spruce beetle attack.

References-- [2](#), [22](#), [23](#), [37](#)

[Management Guide for Spruce Beetle](#)



Figure 65. Egg and larval galleries of spruce beetle showing gregarious feeding habit of larvae.



Red Turpentine Beetle From page 55

Dendroctonus valens LeConte

Hosts-- Ponderosa , lodgepole and piñon pines. Can infest any pine species and is frequently found in other conifers.

Distribution- Range of hosts in Idaho, Montana, Utah, Nevada and California.

Damage- Adults and larvae feed in phloem layer. Blue stain fungi are introduced; however, seldom are trees attacked in sufficient numbers to kill them. Typically, largest and weakest trees are attacked. Trees injured by fire, logging operations, or other damage are preferred.

Identification-- Look for very large, red pitch tubes(fig. 66) concentrated around the basal 3 feet of tree. Egg galleries are irregular in shape but usually vertical and from one-eighth to one-fourth inch wide. Galleries may extend below ground line. Larvae feed in a mass from June to October and make a fan-shaped gallery (figs. 67 and 92f). Adults are the largest in the genus averaging nearly three-eighths inch long, and are distinctly red-brown. Adults fly and attack from spring to midsummer.

Similar Damage-- May be mistaken for other bark beetles, but large "pitch tube," gallery, and size of beetle distinguish red turpentine beetle.

References-- [2, 22, 23, 37](#)

[Management Guide for Red Turpentine Beetle](#)



Figure 66. Large pitch tubes showing attack sites of red turpentine beetle. Attacks are usually confined to lower 3 feet of bole.



a.

Figure 67. Fan-shaped larval gallery pattern of red turpentine beetle with an adult beetle (a), close-up of an adult beetle (b), and gallery with a feeding group of small larvae (c).



b.



c.



Western Pine Beetle From page 56

Dendroctonus brevicomis LeConte

Hosts-- Ponderosa pine.

Distribution- May be found throughout host range except east of continental divide in Montana.

Damage- Larvae and adults feed in phloem layer of inner bark, eventually feeding into outer bark. Feeding girdles and kills the tree. Blue stain fungi are introduced. Usually larger diameter trees are killed, but may kill trees down to 6 inches d.b.h.

Identification-- Initial attacks on a standing tree, in early or later summer, are made about midbole and subsequent attacks fill in above and below. Inconspicuous pitch tubes and red-brown boring dust indicate successful attacks. Egg galleries (figs. 69 and 92b) wind both laterally and longitudinally, crossing and recrossing each other in a maze-like, serpentine pattern which forms a distinctive "signature" of the western pine beetle. Larvae can be found under or in the corky outer bark most of the year. Adults are dark brown to black and slightly less than one-fourth inch long. Trees attacked in September fade the following spring. Those attacked during the summer may fade even before the beetles emerge, depending on weather conditions in any given year. Woodpeckers often flake away bark in search of overwintering larvae (fig. 68).



Figure 68. Pines with bark flaked away by woodpeckers searching for western pine beetle larvae.

Similar Damage-- May be confused with mountain pine beetle or secondary beetles. Conspicuous serpentine galleries distinguish western pine beetle.

References--[2, 12, 22, 23](#)

[Management Guide for Western Pine Beetle](#)



Figure 69. Western pine beetle egg galleries showing characteristic serpentine pattern. Inset; enlargement of larvae feeding in bark.



Roundheaded Pine Beetle From page 57

Dendroctonus adjunctus Blandford

Host-- Ponderosa pine

Distribution- Southern Utah and Nevada

Damage- Once adult beetles bore into the phloem layer of the inner bark, they turn upward constructing long vertical brood galleries, along which eggs are deposited. Larvae radiate outward, feeding in the cambium layer. High densities of adults and larvae from repeated attacks girdle trees, eventually killing them. Trees are attacked in the fall and fade the following spring.

Identification-- White to brownish-red pitch tubes form on the outside of entrance holes. Trees covered with multiple pitch tubes are evidence of successful mass attack. Vertical brood galleries (fig. 70a) are usually 12 inches in length, but could be up to 4 feet. They are tightly packed with dark frass. Larvae produce radiating, horizontal galleries (fig. 70b) which are somewhat meandering. In late stages of development the larvae move out and feed in the phloem (fig. 71).

Similar Damage-- Pitch tubes may also indicate red turpentine beetle, mountain pine beetle or western pine beetle. The gallery patterns and appearance of adult beetles distinguish these species.

References-- [46, 53](#)

[Management Guide for Roundheaded Pine Beetle](#)



a.

Figure 70. Long, vertical egg galleries with eggs deposited at intervals along their lengths (a), and later, with larval mines radiating horizontally (b).



Figure 71. Larvae mining in the bark of a ponderosa pine in the later stages of development.



b.



Mountain Pine Beetle From page 58

Dendroctonus ponderosae Hopkins

Hosts-- Most native and introduced species of pines, except Jeffrey pine.

Distribution- Wherever host species are found.

Damage- Both adults and larvae feed in phloem layer of inner bark. Sapwood may be lightly scored. Feeding girdles the tree. Tree is inoculated with blue stain fungi clogging water transport system. Usually trees are killed, but some may be strip attacked. Trees less than 5 inches d.b.h. are seldom attacked. Large outbreaks of this beetle are common, especially in lodgepole pine.

Identification-- This is one of the few bark beetles that usually make very obvious pitch tubes on bark surface at site of attack (fig. 73). Pitch tubes are masses of red, amorphous resin mixed with bark and wood borings. Boring dust is evident in bark crevices and around base of infested trees.

Under bark, look for straight, vertical egg galleries with crook or "J" at start (fig. 72) which can extend upward 30 inches or more. Galleries are packed tightly with boring dust. Larvae (grubs) are present during fall and winter (fig. 94a). Most pupate in late spring and adults emerge from the bark in midsummer to attack new trees. Mature adults are black and about three-sixteenths inch long. Infested trees fade within a year from yellow-green to red-brown. Thin-bark hosts (primarily lodgepole pine) may have their bark removed by woodpeckers searching for larvae.

Similar Damage-- Boring dust is present with attacks by *Ips* species or other secondary bark beetles. Gallery pattern distinguishes mountain pine beetle. Jeffrey pine beetle is similar but occurs only in Jeffrey pine.

References-- [1, 2, 22, 23](#)

[Management Guide for Mountain Pine Beetle](#)



Figure 72. Mountain pine beetle gallery has a "crook" at the lower end.



Figure 73. Pitch tubes and boring dust are usually evident at mountain pine beetle attack sites.



Jeffrey Pine Beetle From page 59

Dendroctonus jeffreyi Hopkins

Hosts-- Jeffrey pine

Distribution- Throughout the range of the host.

Damage- Jeffrey pine beetle epidemics are rare. This beetle kills individual overmature and mature trees weakened by drought, lightning strike, windthrow and such. Jeffrey pine beetle often attacks the lower stems of trees that have topkill resulting from previous attacks by pine engraver (*Ips pini*).

Identification-- Jeffrey pine beetle typically infests the middle and lower portions of the bole. The gallery pattern is also similar to the mountain pine beetle with a vertical egg gallery, 3 feet or more in length and eggs laid alternately in niches along the sides (fig. 75). The egg galleries usually have a distinctive J-shaped crook at the bottom where the attack was initiated. The larval galleries radiate horizontally from the egg gallery, across the grain of the sapwood. Galleries are tightly packed with boring dust. Adult beetles are very similar to mountain pine beetle (*D. ponderosae*), but are larger. Pitch tubes are inconspicuous or not present. Removal of bark on the lower stem of large Jeffrey pines by woodpeckers often an indication of Jeffrey pine beetle attack.

Similar Damage-- Infestation by *Ips* spp. will result in visible symptoms similar to those of the Jeffrey pine beetle. The presence of a nuptial chamber and the absence of packed boring dust in *Ips* spp. galleries distinguish *Ips* spp. from the Jeffrey pine beetle. Mountain pine beetle adult beetles and galleries are very similar but not seen in Jeffrey pine.

References-- [22.66](#)

[Management Guide for Jeffrey Pine Beetle](#)



Figure 74. Jeffrey pine beetle pupa in a pupal cell within the inner bark.



Figure 75. Jeffrey pine beetle egg and larval galleries. Note the J-shaped crook at the bottom of the center egg gallery.



Pine Engraver Beetles From pages 60-61

Ips spp.; especially, *I. pini* and *I. emarginatus*

Hosts-- *Ips pini* is common in ponderosa, lodgepole, and Jeffrey pines. *Ips emarginatus* is common in ponderosa, white and Jeffrey pines. All species of pines are attacked. A few *Ips* species attack spruce.

Distribution- Range of host species.

Damage- Adults and larvae feed in phloem layer of inner bark. Blue stain fungi are introduced. Tops may be killed in larger trees (fig. 76). Entire trees are killed when populations are high (fig. 77).

Identification-- Look for mounds of red-orange boring dust on the bark of slash, logs, and trees (fig. 79). On standing trees, the dust is most noticeable in bark crevices and around their bases. Removing the bark reveals a Y- , or H-shaped gallery pattern (figs. 80, 92g) usually running with the grain of the wood. These galleries are free of boring dust. Adult beetles are cylindrical, dark red-brown to black, and typically one-eighth to three-sixteenths inch long. Some species may be as long as one-quarter inch. They have a dish-shaped depression on the end of their abdomens with spines along each side (figs. 78, 93b). There may be two or more generations of beetles each year depending on species. Overwintering adults emerge early in the spring and infest slash or winter-damaged trees. This brood develops into adults after 40-55 days, and they attack slash and standing trees by August.



Figure 76. Top kill from *Ips* attack.

Similar damages-- Other secondary bark beetles may be mistaken for *Ips* beetles. Gallery patterns and distinct shape of adults distinguish these species.

References-- [2, 22, 23, 40](#)

[Management Guide for Pine Engraver Beetle](#)



Figure 77. Group kill caused by *Ips pini*.



Figure 78. Adult *Ips* beetle with depression and spines on end of elytra.



Figure 79. Red-orange boring dust on bark of pine attacked by pine engraver beetles.



Figure 80. Gallery pattern of *Ips pini* with the central nuptial chamber and egg gallery branches.

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Piñon Engraver Beetles From page 61

Ips confusus Leconte

Hosts-- Piñon and singleleaf piñon pines.

Distribution-- Utah and Nevada

Damage- *Ips confusus* frequently attacks injured trees or stressed trees. Trees are girdled and eventually killed by the masses of adults and larvae that feed in the phloem layer, beneath the bark. Populations can build in infested stands and slash, moving into green standing trees, if infested material is not removed before the next flight season.

Identification: Tops, main branches or whole trees are killed (fig. 81). Tiny, inconspicuous pitch tubes may be produced where beetles enter the cambium. *Ips confusus* produces galleries similar to those of *I. pini* with a nuptial chamber and three to five branches of egg galleries. There are two to four generations per year. The larvae overwinter in clusters under the bark and consume large patches of the inner bark. Adults have a depression and spines on the end of their elytra similar to other *Ips* spp.



Figure 81. Piñon pine killed by piñon engraver beetles.

Similar damage-- *Ips confusus* is easily confused with *I. paraconfusus* in California and Oregon, but the latter does not attack piñon pines. Mountain pine beetle and *Pityogenes knechteli* have different gallery patterns than *I. confusus*.

References-- [8](#), [22](#), [23](#), [50](#)

[Management Guide for Piñon Engraver Beetle](#)



Douglas-fir Beetle From pages 62-63

Dendroctonus pseudotsugae Hopkins

Hosts--Douglas-fir. Western larch may be attacked, but brood is only produced in downed trees.

Distribution- Range of Douglas-fir.

Damage- Adults and larvae feed in phloem layer of inner bark, girdling tree, and usually killing it. Strip attacks may be made. Tree is inoculated with blue stain fungi. Trees less than 12 inches d.b.h. are seldom attacked.

Identification-- Evidence that a Douglas-fir has been successfully attacked is the red-orange boring dust in bark crevices (fig. 82) or on the ground around the tree. Attacks are often high on the tree's bole, so careful inspection may be required to determine if beetles are present. "Pitch streamers", occasionally observed high on tree boles, at the upper limit of beetle infestation, may indicate an attacked tree. If present, pitch streamers appear as clear resin exuded from entrance holes and dripping many feet down the bole. However, most beetle-killed trees also have boring dust at their base. Therefore, pitch streamers alone are poor indicators of successful attacks.

In the phloem, egg galleries are parallel to wood grain and are commonly 8 to 10 inches in length. Eggs are laid alternately along opposite sides of galleries (fig. 83). Larvae mine outward from the egg gallery and later feed toward the outer bark (fig. 92f). Most broods overwinter as adults in the outer bark. The primary attack period is from mid-April to early June. Beetles that overwintered as larvae attack in midsummer. Adults are about one-fourth inch long, and are black with red-brown wing covers.

Similar damages-- Attacks by secondary bark beetles may produce boring dust in bark crevices. It is usually finer than that made by Douglas-fir beetle. Gallery pattern will distinguish Douglas-fir beetle. A number of injuries, such as frost cracks can produce symptoms similar to pitch steamers.

Reference--[2](#), [22](#), [23](#), [63](#)

[Management Guide for Douglas-fir Beetle](#)



Figure 82. Red-orange boring dust is evidence of successful attack by Douglas-fir beetle.



Figure 83. Egg galleries of Douglas-fir beetle are vertical and the larval galleries are in alternating groups.



Figure 84. Trees killed Douglas-fir beetle will have red crowns several months after a successful attack.



Figure 85. Douglas-fir beetle often kills groups of adjacent trees in successive years. Older dead with little remaining foliage are commonly found near recent mortality. Groups such as this are a good place to look for fresh attacks which will have boring dust on stems but green crowns.

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Cedar Bark Beetles From page 63

Phloeosinus spp.; especially *P. punctatus*

Hosts-- All native junipers, especially Rocky Mountain juniper, *Thuja* species.

Distribution- Range of hosts.

Damage- Adult beetles feed under the bark of tree stem, top, and branches. Although trees are not usually killed, large populations can infest and kill even healthy trees. Most often, dead branches are evidence of infested trees.

Identification-- Egg galleries of *P. punctatus* are vertical with larval galleries radiating, across the wood grain, on both sides (fig. 86). An enlarged chamber is produced on one end of the egg gallery (apparently to allow space to turn around.).

Similar Damage-- Wood borer larvae tunnel within inner bark of juniper but produce broad, flat tunnel without a definite pattern. Twig killing by the juniper twig pruner resembles damage caused by the feeding of newly emerged cedar bark beetle adults.

References-- [22, 23](#)

[Management Guide for Cedar Bark Beetles](#)



Figure 86. *Phloeosinus* sp. egg and larval gallery.



Fir Engraver From page 64

Scolytus ventralis LeConte

Hosts-- Primarily grand fir. Occasionally it will infest subalpine fir.

Distribution- Throughout host range.

Damage- Adults and larvae feed in phloem layer of inner bark. Frequently only patch attacks are made on bole (fig. 87). Often trees are top killed although trees can be killed if attacked by enough beetles (fig. 89). Attacked trees are generally 5 inches or greater in diameter.

Identification-- The gallery pattern of the fir engraver is unique. Unlike most other bark beetles, the female constructs a horizontal egg gallery, perpendicular to the grain of the wood (fig. 88). Red-brown boring dust marks the sites of new attacks during summer months. Eggs are deposited on each side of the gallery and larvae tunnel at right angles to the egg gallery paralleling the wood grain. Larvae are present from midsummer until the next June. Adult beetles are shiny, black, and about one-eighth inch in length. In side view, the end of an adult's abdomen is incurved (fig. 93c).

Similar damages-- Secondary bark beetles attacking grand fir may be mistaken for the fir engraver, but distinct gallery pattern and beetle shape distinguishes it from associates. Root disease is often a precursor.

References-- [2. 17. 22](#)

[Management Guide for Fir Engraver Beetle](#)



Figure 87. Dead patches of cambium under roughened bark may indicate patch attack by fir engraver.



Figure 88. Horizontal egg galleries.



Figure 89. Top kill and tree mortality caused by fir engraver.



Western Balsam Bark Beetle From page 65

Dryocoetes confusus Swaine

Hosts-- Subalpine fir and occasionally grand fir.

Distribution- Throughout the host range.

Damage- Adults and larvae feed in phloem layer of inner bark. Blue stain fungi are introduced. Trees may be strip attacked or attacked in sufficient numbers to kill them (fig. 90).

Identification-- Trees often are attacked in groups. External evidence of attack on the boles of standing trees is hard to detect. Entrance holes and boring dust on the bark may be visible in August. Pitch flow may be evident. Males bore into the phloem, excavate a nuptial chamber, and mate with several females. Egg galleries radiate from the central nuptial chamber in a random pattern (fig. 91). Larvae extend their mines from the main egg galleries until freezing weather, then become dormant. Attacked trees generally turn yellow-red within a year. Adults are shiny, dark brown, cylindrical beetles about one-eighth inch long. Their thorax is evenly convex above and their posterior is abruptly rounded and without spines. A distinctive feature of *D. confusus* females (fig. 93d) is a dense "brush" of hair on the front of the head (frons).

Similar damages-- Other bark beetles may kill subalpine fir, but gallery pattern and characteristics of adult beetles distinguishes this beetle from associates. Root diseases are often associated with attacks by western balsam bark beetles.

References-- [2, 22, 23](#)

[Management Guide for Western Balsam Bark Beetle](#)

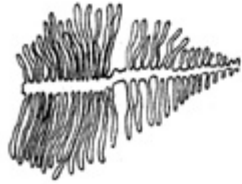


Figure 90. Subalpine fir trees killed by western balsam bark beetle typically have bright red crowns for a year or two after death.

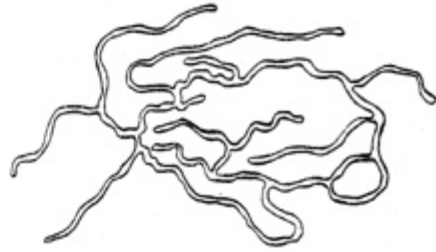


Figure 91. The distinctive gallery pattern of western balsam bark beetle results from the male excavating a central nuptial chamber from which the several females radiate out to produce their egg galleries.

Figure 92. Bark Beetle gallery patterns. From page 66



a. Fir engraver



b. Western pine beetle



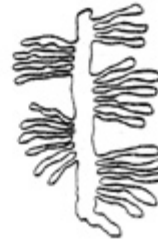
c. Western balsam bark beetle



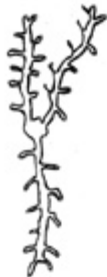
**d. Mountain pine beetle,
Jeffrey pine beetle**



e. Spruce beetle



f. Douglas-fir beetle

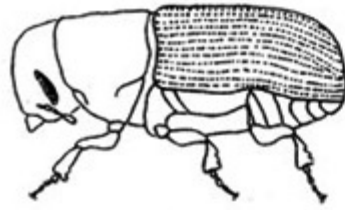


**g. Pine engraver,
Piñon engraver beetles**

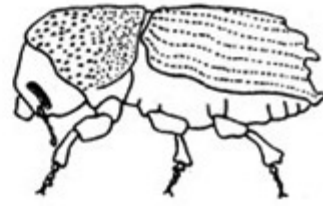


h. Red turpentine beetle

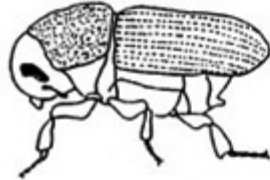
Figure 93. Comparison of body shapes of four common genera of bark beetles. From page 67



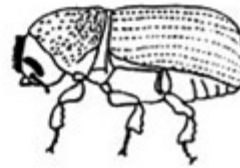
a. Dendroctonus



b. Ips



c. Scolytus



d. Dryocoetes

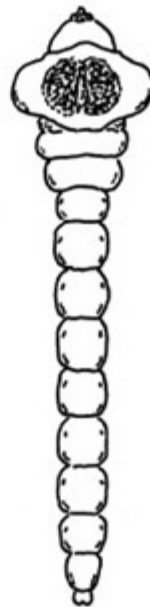
Figure 94. Comparison of larval shapes of bark beetles (Family: Scolytidae) and three common wood borers (Families: Cerambycidae, Buprestidae and Siricidae).



a. Bark beetle



b. Roundheaded borer



c. Flatheaded borer



d. Wood wasps