

# Ambrosia Beetles –Coleoptera: Curculionidae: Scolytinae

## *Trypodendron lineatum* Striped ambrosia beetle

Economic importance:

Beetles attack only dead or severely weakened trees, and felled logs. Beetles bore into sapwood and introduce ambrosia fungi. Galleries and fungal staining result in degrade of lumber and veneer, causing severe economic loss to the forest industry, especially in coastal BC.

FYI... In 1990-92, the Ambrosia Beetle Task Force determined that 14% of all logs entering coastal sawmills of MacMillan Bloedel Ltd. had been attacked by ambrosia beetles. Of the 5 million m<sup>3</sup> checked that year, the total degrade loss was estimated at \$11 million. The majority of attacks occurred in the forest emphasizing the need to minimize the time between felling and transportation to the mill.

**Principal hosts:** *Abies*, *Picea*, *Pseudotsuga*, *Tsuga* spp.

Notes:

---



---



---



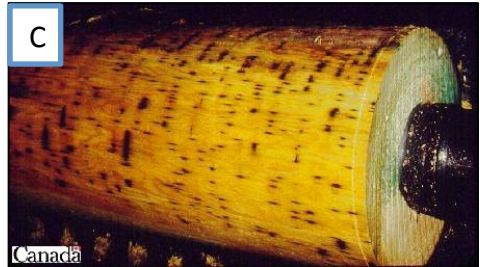
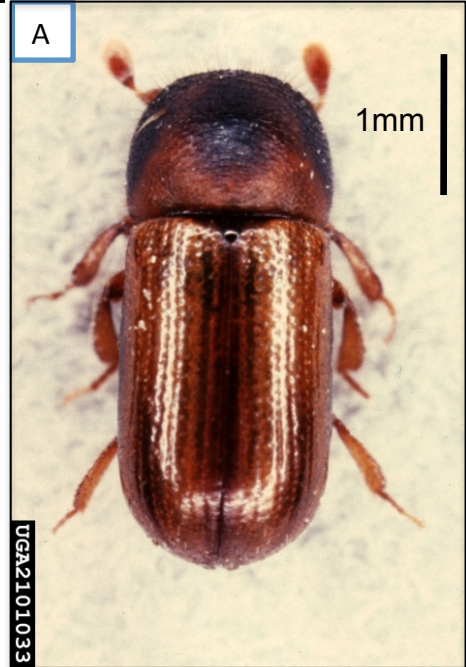
---



---



---



### Adult

Body	Antennae	Special Feature	Injury
Shiny black or brown with <b>pale stripes (A)</b>	<b>Club shaped (A)</b> Small Elbowed	' <i>lineatum</i> ' = stripes Overwinter in duff	<b>Boring into the sapwood (B)</b> <b>Introduction of ambrosia fungi (C)</b>

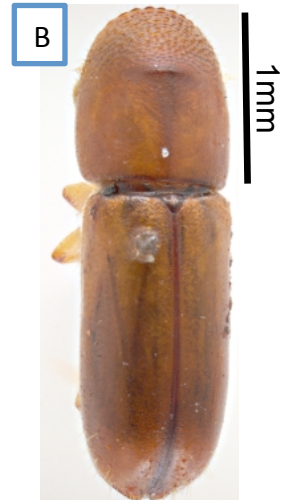
### Larvae

Body	Injury
<b>White body, dark head and mandibles</b> Curved Legless	Larvae do not cause injury (boring only by adults) (B) <b>Larvae feed on ambrosia fungi</b>

Images:A) Daniel Adam, Office National des Forêts, Bugwood.org  
B) Milan Zubrik, Forest Research Institute - Slovakia, Bugwood.org  
C) Natural Resources Canada, Canadian Forest Service

# Gnathotrichus sulcatus

## Scratch-faced ambrosia beetle



Economic importance:

Beetles bore into sapwood and introduce ambrosia fungi, reducing the value of lumber (same as *T. Lineatum*). *Not as economically important as T. Lineatum.*

Injury creates problems for lumber export. Since beetles spend their whole life cycle inside a log, they can survive in lumber that is milled and continue development while on the way to the market. *G. sulcatus* also attacks green lumber in sawmill yards which greatly adds to the quarantine problem in export markets.

**Principal hosts: nearly all western conifers**

Notes:

---



---



---



---



---



---



---



### Adult

Body	Antennae	Special Feature	Injury
<p>Slightly more slender than <i>T. lineatum</i> (A, B)</p> <p>Head less visible from above (B)</p>	<p>Club shaped (A)</p> <p>Small</p> <p>Elbowed</p>	<p>Beetles spend almost their whole life cycle inside logs</p>	<p>Introduction of ambrosia fungi (C)</p> <p>Boring into the sapwood (D)</p>

### Larvae

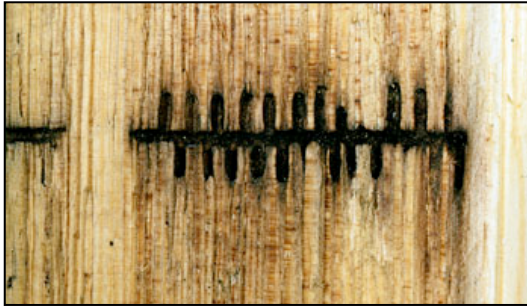
Body	Injury
<p>White body, dark head and mandibles</p> <p>Curved</p> <p>legless</p>	<p>Larvae do not cause injury (boring by adults) (D)</p> <p>Larvae feed on ambrosia fungi (C)</p>

Images: A, D) Pest and Diseases Image Library, Bugwood.org  
 B, C) [http://www.forestry.ubc.ca/fetch21/FRST308/lab7/gnathotrichus\\_sulcatus/scratch.html](http://www.forestry.ubc.ca/fetch21/FRST308/lab7/gnathotrichus_sulcatus/scratch.html)

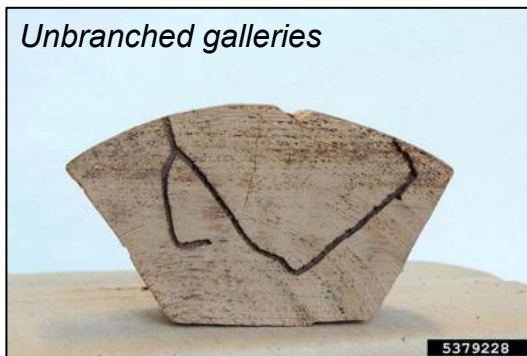
# Ambrosia beetle signs in the field:

## *Trypodendron lineatum*

1. *Straight larval galleries*



2. *Unbranched galleries*



3. *Larger diameter entrance*

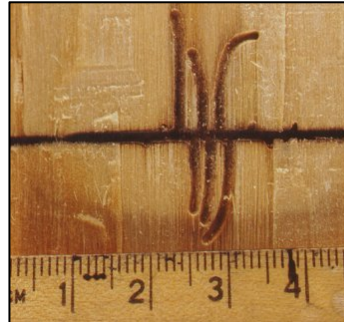


4. *White frass around entrance holes on bark is present for both, and indicates injury is NOT from bark beetles*



## *Gnathotrichus sulcatus*

- Slightly curved larval galleries*



- Branched galleries across growth*



- Smaller diameter entrance holes*



Images (L to R): 1) Stanislaw Kinelski, forestryimages.org; [http://www.forestry.ubc.ca/fetch21/FRST308/lab7/gnathotrichus\\_sulcatus/scratch.html](http://www.forestry.ubc.ca/fetch21/FRST308/lab7/gnathotrichus_sulcatus/scratch.html)

2) Wayne Brewer, Auburn University, Bugwood.org; [http://www.forestry.ubc.ca/fetch21/FRST308/lab7/gnathotrichus\\_sulcatus/scratch.html](http://www.forestry.ubc.ca/fetch21/FRST308/lab7/gnathotrichus_sulcatus/scratch.html) 3

3) Daniel Adam, Office National des Forêts, Bugwood.org

4) Milan Zubrik, Forest Research Institute - Slovakia, Bugwood.org

# Bark Beetles - Coleoptera: Curculionidae: Scolytinae

## *Dendroctonus ponderosae* Mountain pine beetle

Economic importance:

Most destructive of the bark beetles. It can kill mature pine forests over extensive areas.

**Principal hosts: *Pinus* spp - breeds in virtually all species of native and introduced pine.**

Signs in the field:

1. Pitch tubes on bole (absent in years of drought) (A)
2. J-shaped maternal galleries packed with frass (B, E)
3. Blue-stain in sapwood (C)
4. Red foliage one year after attack. (D)

Notes:

---



---



---



---



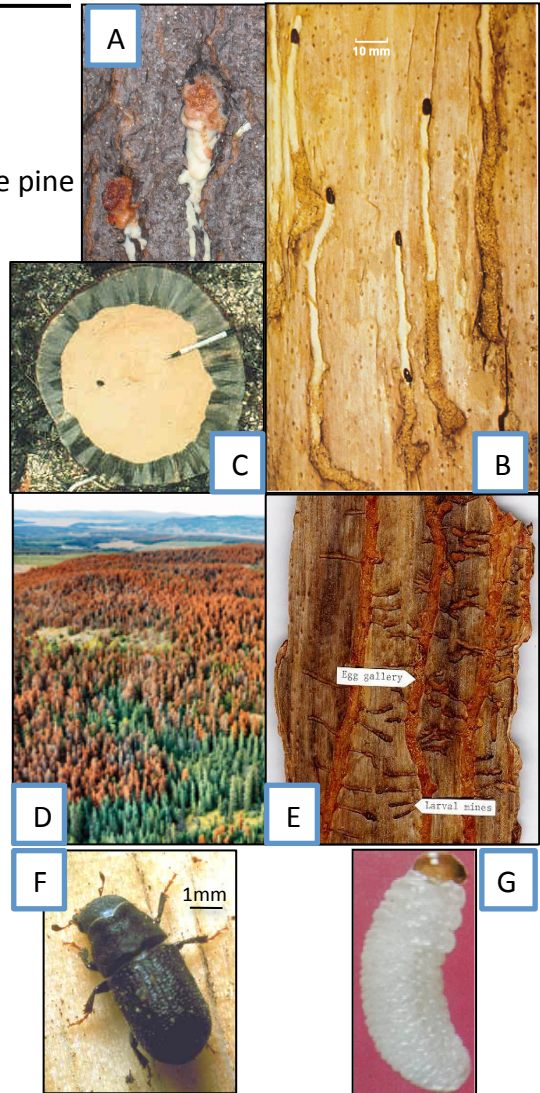
---



---



---



### Adult

Body	Antennae	Injury
Dark, cylindrical (3 – 8mm) (F)	<b>Club shaped (F)</b> Small Elbowed (F)	<b>“J-shaped”</b> egg galleries (30 - 60 cm long) <b>parallel to the grain of wood in cambial region; filled with frass (B)</b>  <b>Blue-stain fungi (C) introduced via mycangia</b>

### Larvae

Body	Injury
<b>White body, dark head and mandibles (G)</b> Curved, legless (G)	Create feeding galleries <b>at right angles to the parent gallery (E)</b>  High densities girdle tree

Images: A, B, C, D, E, F, G) Natural Resources Canada, Canadian Forest Service

# *Dendroctonus rufipennis* Spruce beetle

Economic importance: Sporadic epidemics, often following wind-throw events or successive warm summers. Can kill mature forests over extensive areas.

**Principal hosts: Mature spruce. Low populations breed in stumps, slash and windfall.**

Signs in the field:

1. Boring dust evident in spring
2. Pitch tubes may be visible in summer (A)
3. Orange foliage 1 – 2 years after attack. (B)

Notes:

---



---



---



---



---



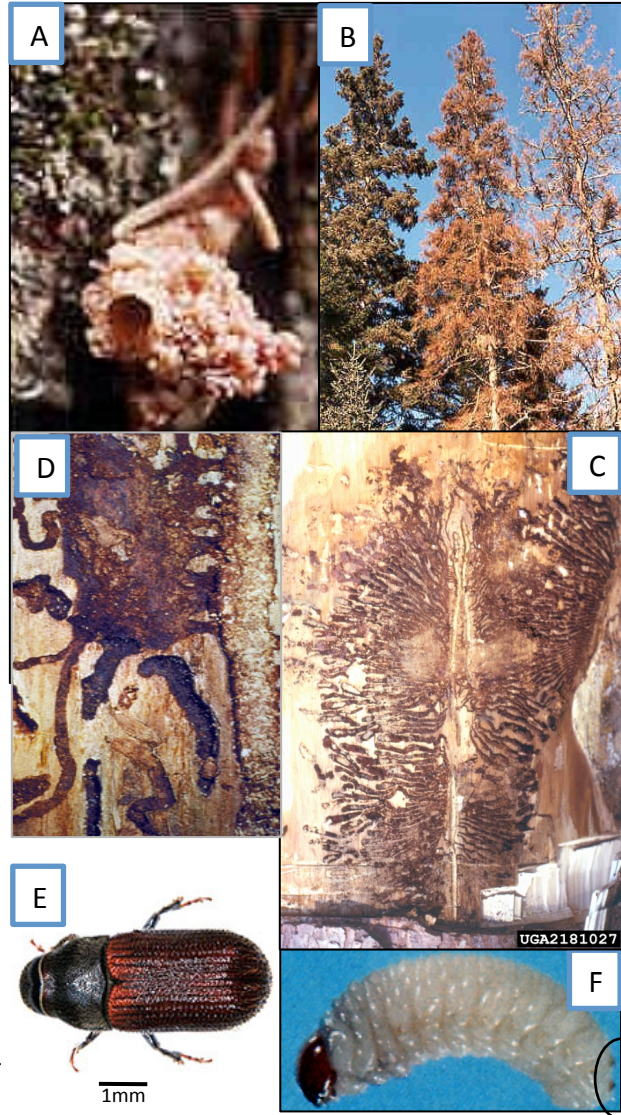
---



---



---



## Adult

Body	Antennae	Injury
Cylindrical, reddish-brown to black (4 - 7mm long) (E)	Club shaped Small Elbowed	Egg galleries 10 – 30cm long parallel to the grain of wood, <u>not</u> packed with frass (C) <b>Wide straight gallery (C)</b>

## Larvae

Body	Injury
White body, dark head and mandibles Curved, legless <b>Sclerotized plate on dorsal side of each of the last two abdominal segments (F)</b>	<b>First- and second-instar larvae feed gregariously (D)</b>

Images: A, B) Maine Dept. of Conservation, Main Forest Service <http://www.maine.gov/doc/mfs/alertspr.htm>  
 C) D. Blackford, USDA Forest Service, Bugwood.org  
 D) [keys.lucidcentral.org/keys/v3/wbb/key/Woodboring\\_Families/Media/Images/fact\\_sheets\\_small/U\\_Dendroctonus\\_rufipennis\\_d.jpg](https://keys.lucidcentral.org/keys/v3/wbb/key/Woodboring_Families/Media/Images/fact_sheets_small/U_Dendroctonus_rufipennis_d.jpg)  
 E) [www.for.gov.bc.ca/hfp/publications/00198/51%20to%20100/fig68.jpg](http://www.for.gov.bc.ca/hfp/publications/00198/51%20to%20100/fig68.jpg)

# *Dendroctonus pseudotsugae* Douglas-fir beetle

Economic importance:

Sporadic epidemics. Unsuccessful attacks create pitch pockets in lumber. Capable of killing mature forests over extensive areas at epidemic levels.

**Principal hosts: Douglas-fir, occasionally western larch. Low populations breed in slash, windfall or diseased trees.**

Signs in the field:

1. Attacks are often several meters up the bole
2. No pitch tubes, but tree may exude resin
3. Reddish boring dust in bark crevices (B)
4. Orange foliage one year after attack. (C)

Notes:

---



---



---



---



---



---



---



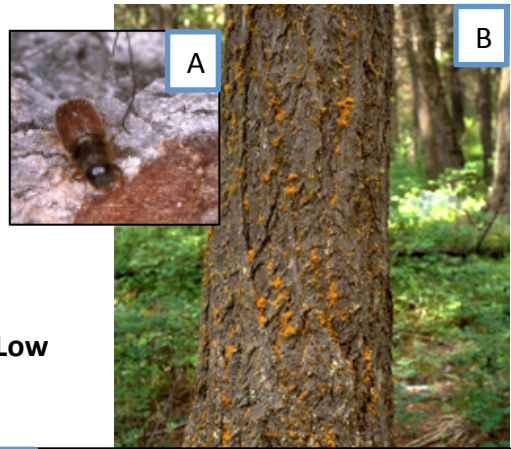
---



---



---



## **Adult**

Body	Injury
Light brown, black head (4 - 7.5 mm long) (A)	Egg galleries average 10 – 50cm long (E)

## **Larvae**

Body	Injury
White body, dark head and mandibles (D)	<b>Artistically symmetrical galleries (E)</b>

Images: A) USDA Forest Service, Region 4 Archive  
 B) Sandy Kegley, USDA Forest Service, Bugwood.org  
 C) BC Ministry of Forests and Range [http://www.for.gov.bc.ca/hfp/publications/00198/douglas-fir\\_beetle.htm](http://www.for.gov.bc.ca/hfp/publications/00198/douglas-fir_beetle.htm)  
 D) <http://zipcodezoo.com/Photographers/1125/hp350.asp>  
 E) A. Carroll

# *Dendroctonus brevicomis*

## Western pine beetle

Economic importance:

Minor pest in BC.; however, in Oregon, Washington and California, large areas of ponderosa pine have suffered extensive mortality.

**Principal hosts: Ponderosa pine (other pines during outbreaks); sub-outbreak populations prefer trees weakened by drought, old age, overstocking, wind damage, fire or disease.**

Signs in the field:

1. Reddish-brown pitch tubes on bole (B)
2. Reddish boring dust in bark crevices and at base of tree
3. Foliage fades to orange during year after attack (A)

Notes:

---



---



---



---



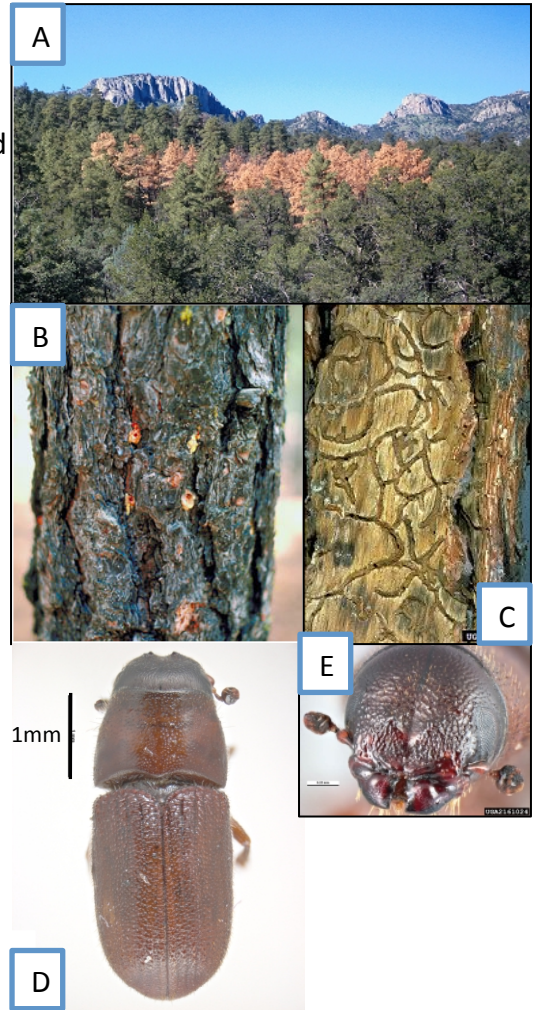
---



---



---



### Adult

Body	Antennae	Injury
Dark, cylindrical (3 - 5 mm long) (D)	Clubbed, elbowed (E)	<b>Egg galleries appear random, across and with the grain, and very branched (C)</b>

### Larvae

Body	Injury
White body, dark head and mandibles Curved, legless	Larvae feed out from adult galleries

Images: A) James Everitt, , Bugwood.org  
 B) K.E. Gibson, USDA Forest Service, Bugwood.org  
 C) Pest and Diseases Image Library, , Bugwood.org  
 D) William M. Ciesla, Forest Health Management International, Bugwood.org  
 E) Pest and Diseases Image Library, Contact: Ken Walker, Museum Victoria

# *Ips pini* Pine engraver

## Economic importance:

Populations may build in leftover phloem of trees attacked by primary bark beetles and cause considerable mortality to residual trees in stands after primary beetle populations collapse. The pine engraver is just one of approximately 2 dozen species in the genus *Ips* in North America.

## Principal hosts: Most pines.

### Signs in the field:

1. Mortality of vigour-impaired trees, attacks on windthrow and slash (A)
2. Boring dust around entrance holes (B)
3. Scoring (i.e. engraving) of sapwood (C)

### Notes:

---



---



---



---



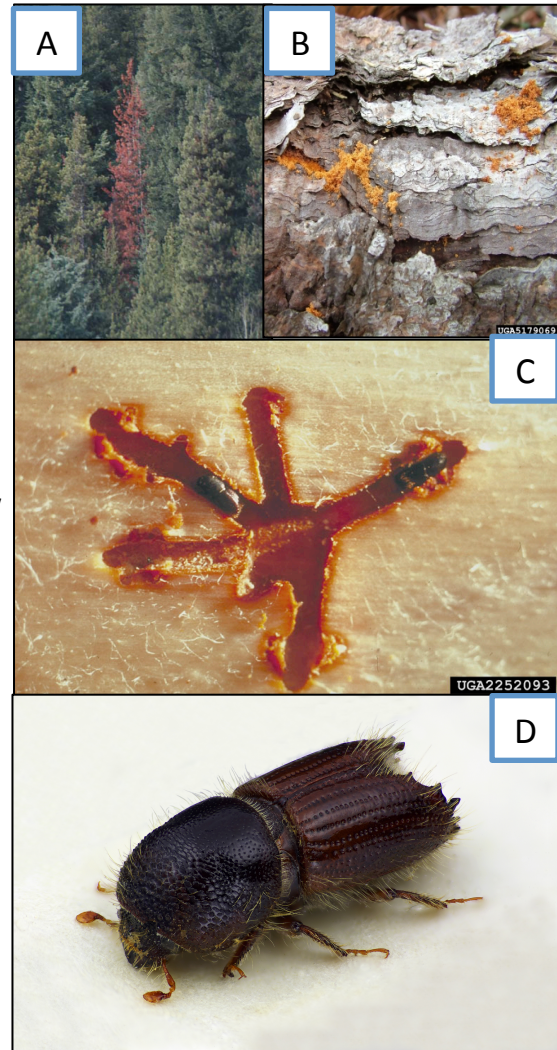
---



---



---



## Adult

Body	Special Feature	Injury
Cylindrical; 3 – 5mm long (D) Reddish-brown to black <b>Pronounced dorsal concavity (declivity) in the rear of elytra with spines along margins (D)</b>	Polygamous	<b>Egg galleries radiate from nuptial chamber (C)</b> <b>Scores (engraves) the sapwood (C)</b>

## Larvae

Body	Injury
<b>White body, brown head capsule</b> Curved, legless	Larval mines radiate out from egg galleries

Images: A) A. Carroll  
 B) Jeffrey Eickwort, Florida Department of Agriculture, Bugwood.org  
 C) Scott Tunnock USDA Forest Service, Bugwood.org  
 D) Karsten Sund, www.skogoglandskap.no/slideshows/barkbiller\_foto\_til\_mediaomtale



# Dryocetes confusus

## Western balsam bark beetle

Economic importance:

Most destructive pest of its genus, and an important pest in the ESSF. It causes extensive injury throughout the range of its main host.

**Principal hosts: Sub-alpine fir (occasionally *Abies* spp., Engelmann spruce, lodgepole pine); sub-outbreak populations prefer trees weakened by overstocking.**

Signs in the field:

1. Resin exudation and boring dust on bole (no pitch tubes)
2. Foliage fades to bright red during year after attack (A)

Notes:

---



---



---



---



---



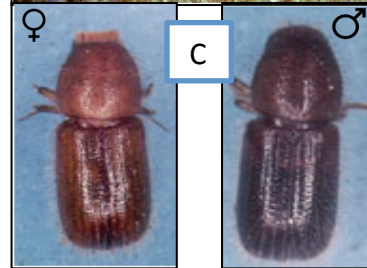
---



---



---



### Adult

Body	Special Feature	injury
Shiny black-brown (3.4 – 4.3 mm) (C) <b>Female has dense brush of yellow setae on its frons; male frons sparsely pubescent (C)</b>	Polygamous, 3 - 4 females for each male	Egg galleries radiate out from central nuptial gallery (B) <b>Minimal scoring in sapwood</b>

### Larvae

Body	Injury
White body, lightly sclerotized head Curved, legless	Larvae feed out from adult galleries, indiscriminately wandering entirely in the phloem (B)

Images: A, B) Scott Tunnock, USDA Forest Service, Bugwood.org  
 C) USDA Forest Service - Rocky Mountain Region Archive, USDA Forest Service, Bugwood.org

# *Scolytus ventralis*

## Fir engraver

Economic importance:

Major pest of true firs (esp. in the US). Trees may be killed or partially killed. Outbreaks occur following periods of stress (drought, disease, defoliation).

**Principal hosts: *Abies grandis*, *A. concolor*, *A. magnifica* (occasionally Douglas-fir, hemlock or spruce).**

Signs in the field:

1. Red or partially red crowns (A)
2. Egg galleries constructed across the grain (B)

Notes:

---



---



---



---



---



---



---



### Adult

Body	Special Feature	Injury
Dark, cylindrical, 4 mm long <b>Ventral posterior declivity</b> (C)	Males have a well defined tubercle (bump) on second abdominal segment	<b>Egg galleries score the sapwood deeply across the grain from each side of a central entrance chamber (B)</b>

### Larvae

Body	Injury
White body, brown head capsule  Legless, curved	Larvae mine outward from egg gallery

Images: A) William M. Ciesla, Forest Health Management International, Bugwood.org  
 B) Scott Tunnock, USDA Forest Service, Bugwood.org  
 C) Donald Owen, California Department of Forestry and Fire Protection, Bugwood.org

# *Pseudohylesinus* spp.

Economic importance:

Most species are not aggressive, only 2 have been recorded as killing trees. Usually attack dying, dead, and downed trees

**Principal hosts: *Abies* spp., *Pinus* spp., *Picea* spp., and western hemlock.** Some beetles are host specific: *P. nebulosus* (Douglas-fir), *P. sericeus* (Pacific silver fir), *P. tsugae* (western hemlock). Often co-attack with other bark beetle species, e.g., *P. nebulosus* attacks upper thinner barked areas of Douglas-fir, while *Dendroctonus pseudotsugae* attacks the lower bole.

Signs in the field:

1. Top kill (upper bole attacks) (A)

Notes:

---



---



---



---



---



---



---



## Adult

Body	Injury
Patchy coloured, 2.2 – 3.0 mm long <b>Elytra covered with scales giving a dull appearance instead of a bare shiny look as in other bark beetles (C)</b>	<b>Egg galleries similar to <i>Scolytus</i>, transverse across grain (B)</b> <b>Sapwood only lightly scored (B)</b>

## Larvae

Body	Injury
Typical bark beetle larvae	Larvae mines outward from adult gallery (B)

Images: A) A.S. Munson, USDA Forest Service, Bugwood.org  
 B) W.M. Ciesla, Forest Health Management International, Bugwood.org  
 C) E.R. Hoebeke, Cornell University, Bugwood.org

## *Phloeosinus* spp. Cedar bark beetles

Economic importance:

Not aggressive (secondary). Occasionally they become numerous enough to attack and kill apparently healthy trees. Increasing levels of tree mortality in recent years due to drought stress.

**Principal hosts: Cedars; since cedars are attacked by almost no other bark beetle, any species found in the inner bark of cedar-like trees (not *Cedrus*) will likely be a *Phloeosinus* spp.**

Signs in the field:

1. Cedar twig dieback (A)
2. Tree mortality following drought

Notes:

---



---



---



---



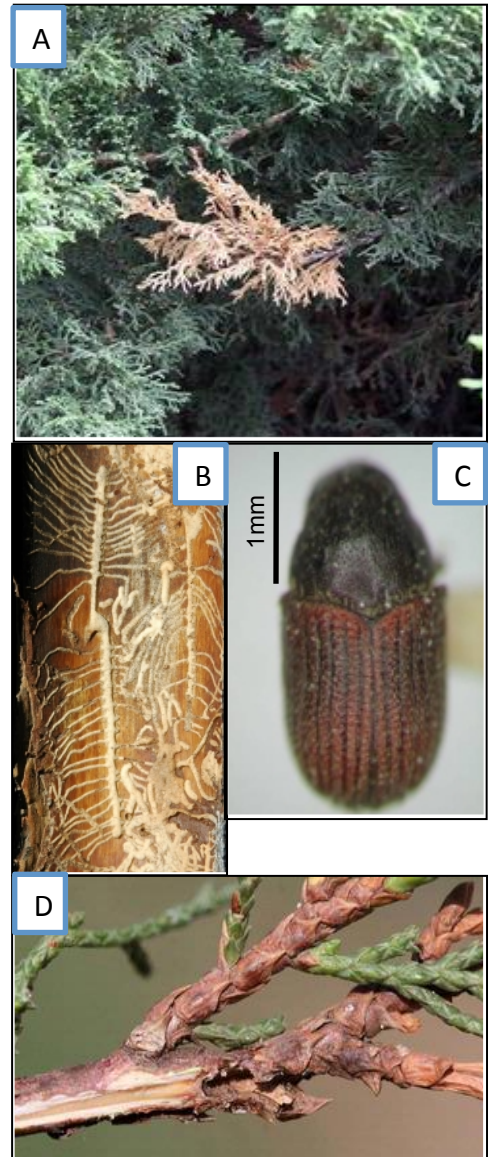
---



---



---



### **Adult**

Body	Injury
Reddish-brown elytra, black head, 2 – 3mm long (C)	<p><b>Egg galleries parallel to grain and relatively straight (B)</b></p> <p><b>Newly emerged adults feed on twigs of healthy trees, hollowing them out and killing them prior to gallery construction (D)</b></p>

### **Larvae**

Body	Injury
<p>White body, brown head capsule</p> <p>Curved, legless</p>	Larvae mine outward from adult gallery (B)

Images: A, D) Whitney Granshaw, Colorado State University, Bugwood.org  
 B) William M. Ciesla, Forest Health Management International, Bugwood.org  
 C) E.R. Hoebeke, Cornell University, Bugwood.org

## B) Lepidoptera: Sesiidae

### *Synanthedon novarensis* Douglas-fir pitch moth

Economic importance:

Injury from this insect results in grade reductions of lumber. Can be seriously damaging to young trees as well.

**Principal hosts: Douglas-fir, Sitka spruce, Engelmann spruce, lodgepole pine, ponderosa pine**

Signs in the field:

1. Large pitch masses around feeding sites (A)

Notes:

---



---



---



---



---



---



---



### **Adult**

Body	Special Feature	Damage
Small moth with narrow, transparent, interlocking wings (wingspan 30 mm); mimics a wasp (B) Abdomen is orange-banded with black (B)	<b>Long ovipositor</b>	Does not injure tree

### **Larvae**

Body	Damage
Cream coloured with brown heads; up to 30 mm long when mature (C)	Injurious stage <b>Larvae chew into bark and then into the phloem, forming pitch pockets (C)</b> Injury may be perennial, keeping wounds open

Images: A, C) L. Rocchini, <http://web.unbc.ca/ctl/webcourses/fsty307/bark/bark.html>  
B) L. Friskie, <http://web.unbc.ca/ctl/webcourses/fsty307/bark/bark.html>