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GENERAL NOTES ON THE OCCURRENCE AND DAMAGE OF CONE AND SEED
INSECTS IN ALBERTA AND THE ROCKY MOUNTAIN NATIONAL PARKS

by

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OF CONE AND SEED INSECTS IN ALBERTA AND THE ROCKY MOUNTAIN
NATIONAL PARKS.

These notes are a summary of observations made by the writer while attached to the Forest Insect Survey, Forest Zoology Laboratory, Calgary, Alberta.

Most of the cone collections and many of the insect rearings were made by the Forest Insect Rangers. Mr. D.S. Kusch took the photographs. Where possible observations are supplemented by reference to more complete published studies.

The insects are discussed under host tree headings. The botanical names of these trees are as follows:- lodgepole pine, Pinus contorta Dougl. Var. latifolia Engelm; limber pine, Pinus flexilis James; white spruce, Picea glauca (Moench) Voss; Engelmann spruce, Picea engelmannii (Parry) Engelm; Douglas fir, Pseudotsuga menziesii (Mirb.), alpine fir, Abies lasiocarpa (Hook) Nutt.

LODGEPOLE PINE.

Laspeyresia sp. The adult is a small grey moth. The larva was not observed.

Known distribution - Northern Alberta.

General. - Little is known of this insect. The larva works inside the cone. The adult emerges through a small round hole on the outside of the cone.

Insect damage to lodgepole pine cones is uncommon.

LIMBER PINE

Diorvctria sp. See the larval description in the white spruce section. (Fig. 1.)

Known distribution - Tunnel Mountain, Banff National Park.

General - The larvae mine inside the cone. They make circular entry holes, which are conspicuous on the outside of the cone. The frass is forced outside. The larvae pupate in loose hibernacula which are constructed outside the cone.

This insect is not common but its distribution is likely more widespread than indicated here.

WHITE SPRUCE AND ENGELMANN SPRUCE

Key to insects causing damage in white spruce cones.

A. Feeding damage visible outside the cone:

Diorvctria abietella, Eupithecia spp.

B. Feeding damage not visible outside the cone:

Damage in seeds only - Phytoptaga sp.

Damage in cone rachis - Laspeyresia youngana

Dasyneura sp. (poss.
rachiphaga)

Damage throughout cone-bracts and seeds:

Laspeyresia youngana

Dasyneura sp. (poss.
canadensis)

Earomyia barbara

Laspeyresia youngana (Kft). The larva of this small moth has a white body and a brown head. The prothoracic shield is brown. The length is up to 10 mms.

Known distribution

- Northern Alberta and the Rocky Mountain Region.

General

- The larvae mine into the rachis of the cone and hollow it out. They also burrow through the cone scales and seeds. There may be several larvae in one cone. The presence of larvae within the cone is seldom apparent from the outside. The larvae pupate in the hollowed out rachis, or between the cone scales. In 1950, at the Kananaskis Forest Experiment Station, the adults emerged in May - June and larvae pupated in September - October.

This insect is very common.

Reference - Tripp, H.A. 1954 -Biology of *Laspeyresia youngana*. Can. Ent. 86:9.

Diorcyctria abietella D & S (Fig. 1.) The early instars of the larvae have the following general appearance: prothoracic shield dark brown; dorsal region brown; ventral region lighter brown; faint pattern on dorsal region. The later instars have the following general appearance; prothoracic collar dark brown, pale brown on the pos-

terior margin; long sparse setae on the body; body reddish in colour and turning purple towards prepupal stage; conspicuous segmental folds; in last instar approximately 16 mms. long.

Known distribution

- Rocky Mountain Region.

General

- The larva burrows throughout the cone. It works from the outside of the cone to the inside. It is considered an external feeder, as opposed to Laspeyresia. There may be several larvae in one cone. The frass is pushed outside the cone, and collects in a large mass partially retained by webbing. The larvae overwinter within the excavated chamber or in a loosely spun hibernaculum outside the cone.

This insect is common.

References - Lyons L.A. 1957 -Insects affecting seed production in red pine.

Pt. II - Diorvctria spp. Can. Ent. 89:2

- McKay M.R. 1943 -The spruce foliage worm and the spruce cone worm. Diorvctria spp. Can. Ent. 75:5.

- Ross D.A., D. Evans 1957. Annotated list of forest insects of British Columbia, Pt. 5. Diorvctria spp. Proc. Ent. Soc. B.C. 53.

Eupithecia spp. (Fig. 2).

The adults are slender grey moths. There are two known species, the larvae of which feed on spruce cones. These are E. Mutata

Pearsall and E. albicapitata Packard. The larvae can be separated by the following table (after W.C. McGuffin).

Species	<u>E. albicapitata</u>	<u>E. mutata</u>
Color	Pale lines on pale pink or brown body.	Pale pink body unlined.
Size	Stout about 10 mm. between 2.3 - 2.7 mm.	Slender about 10 mm. about 1.9 mm.
Known distribution.	Rocky Mountain Region.	Cold Lake, Alberta.

General

The larvae are mainly external feeders. They excavate large cavities in the cone. The frass is forced outside the cone and collects in a large mass held by webbing. The later stages of damage are conspicuous due to the external signs of feeding.

Reference - Ross D.A., D. Evans 1956. Annotated list of forest insects in British Columbia. Pt. III Eupithecia spp. Proc. Ent. Sec. B.C. 52.

Earomyia barbara McAlpine

The maggots of this fly are white and legless (See Fig. 3).

Known distribution.

Northern Alberta and the Rocky Mountain Region.

General

The maggots burrow throughout the cone. Damage is not visible from the outside. Larval galleries are distinct in the green cones. There may be 3 or 4 maggots in one cone. In the fall the maggots leave the cones, and pupate in the forest duff. Adults emerge in the spring.

Reference - McAlpine J.F. 1956. Cone infesting lonchaeids of the genus Faromyia Zett. Can. Ent. 88:4.

Dasvneura sp (poss. canadensis) The maggots of this midge are very small, flattened and orange in color.

Known distribution.

Northern Alberta and the Rocky Mountain Region.

General

The maggots feed on the scales, and cause small galls. The maggots feed inside these galls. Before pupating the galls are lined with white silk.

Reference - Tripp H.E. 1955. Descriptions and habits of Cecidomyiidae (Diptera) from white spruce. Can. Ent. 87:6.

Dasvneura sp. (poss. rachiphaga) The maggots of this midge are small, flattened and orange colored.

Known distribution.

Northern Alberta and the Rocky Mountain Region.

General.

These maggots burrow into the rachis of the cone hollowing it out. They spin white

cocoons in the rachis and pupate in the cocoons.

Reference - Tripp H.E. 1955. Descriptions and habits of Cecidomyridae (Diptera) from white spruce. Can. Ent. 87:6.

Phytophaga sp.

The maggots of this midge are flattened and pink to orange in color.

Known distribution.

Northern Alberta and the Rocky Mountain Region.

General

These maggots hollow out the seeds. They spin white cocoons in the seeds and pupate there.

Reference - Tripp H.E. 1955. Description and habit of Cecidomyiidae (Diptera) from white spruce cones. Can. Ent. 87:6.

DOUGLAS FIR.

Diorvetria abietella D & S.

A general description of the larva of this moth is given in the white spruce section.

Known distribution.

Rocky Mountain Region.

General

The larvae are external feeders. There may be several in one cone. They excavate large cavities and push the frass to the outside. Much of the frass is retained on the outside by webbing. The larvae overwinter within the cone or in loosely spun hibernacula outside the cone.

- References - Lyons L.A., 1957. Insects affecting seed production in red pine. Pt II - Diorvctria spp. Can. Ent. 89:2.
- McKay M.R., 1943. The spruce foliage worm and the spruce cone worm. Diorvctria spp. Can. Ent. 75:5.
- Ross D.A., D. Evans, 1957. Annotated list of forest insects of British Columbia. Pt 5. Diorvctria spp. Proc. Ent. Soc. B.C. 53.

Earomyia aquilonia McAlpine, E. barbara McAlpine.

The maggots are white and legless. At maturity they are near the length of house fly maggots but not as thick. (See Fig. 3 and 4).

Known distribution.

Banff and Kootenay National Parks.

General.

The maggot burrows throughout the cone. There may be several in one cone. Damage is not visible from the outside. In green cones the galleries are distinct. It is believed mature maggots leave the cones in the fall and pupate in the forest duff.

- References - McAlpine J.F. 1956. Cone infesting lonchaeids of the genus Earomyia Zett. Can. Ent. 88:4.
- Tripp H.A. 1954. The instars of a maggot inhabiting white spruce cones. Can. Ent. 86:4.

- Megastigmus spermatrophus Wachtl. The larvae of this small wasp are white and legless.
- Known distribution Rocky Mountain Region.
- General The adult deposits the eggs within the immature seeds. The larva feeds entirely within the seed. The seed coat remains undamaged. The adult emerges by cutting a small circular hole in the seed coat
- Reference - Keen F.P. 1938. Insect enemies of western forests. U.S.D.A. Misc. Pub. 273. Washington, D.C.

ALPINE FIR

- Diorvctria abietella D & S. (Fig. 1). A general description of the larva of this moth is given in the white spruce section. It is not common on alpine fir.
- Known distribution Rocky Mountain Region.
- General The larva is an external feeder. There may be several in one cone. They excavate large cavities in the cone and push the frass to the outside. The frass may collect on the outside in conspicuous masses.
- References - Lyons L.A. 1957. Insects affecting seed production in red pine. Pt. II - Diorvctria spp. Can. Ent. 89:2.
- McKay M.R. 1943. The spruce foliage worm and the spruce cone worm. Diorvctria spp. Can. Ent. 75:5.

Ross D.A.,)1957. Annotated list of forest insects of British
Evans D.)
Columbia. Pt 5. Diorvctria spp. Proc. Ent.
Soc. B.C. 53.

Eupithecia columbrata Mc.D. Similar to the larva illustrated in Fig. 2.

The larva of this moth has a pale orange
body.

Known distribution Junction of the Simpson and Vermilion rivers.
Kootenay National Park.

General The larva excavates a large cavity in the
cone. The frass is forced outside and may
collect in a conspicuous mass. This species
likely has a wider distribution than is
indicated here. It is not common.

Reference - Ross D.A., Evans D. 1956. Annotated list of forest insects in
British Columbia. Proc. Ent. Soc. of B.C.,
52.

Faromyia aquilonia McAlpine. The maggots of this fly are white and leg-
less (Fig. 4)

Known distribution Banff and Kootenay National Parks.

General The maggots burrow throughout the cone.
There are generally 3 or 4 in one cone. The
larval galleries are distinct in green cones.
Mature maggots leave the cone in the fall and
pupate in the forest duff.

Reference - McAlpine J.F. 1956. Cone infesting lonchaeids of the genus
Faromyia Zett. Can. Ent. 88:4.

Megastigmus lasiocarpae Crosby. The larvae of this small black wasp are white and legless.

Known distribution Banff and Kootenay National Parks.

General. The egg is deposited within the immature seed. The larva feeds inside the seed. The adult emerges from the seed by cutting a circular hole in the seed coat.

References - Hedlin A.F. 1956. Studies on the balsam fir seed chalcid, Megastigmus specularis. Can. Ent. 88:12.

PLATES

- Fig. 1. Mature larvae of Diorvctria abietella feeding on a Douglas fir cone.
- Fig. 2. Mature larvae of Eupithecia mutata feeding on a white spruce cone.
- Fig. 3. Mature maggots of Earomyia barbara in a white spruce cone.
- Fig. 4. Mature maggot of Earomyia aquilonia feeding on an alpine fir cone.

