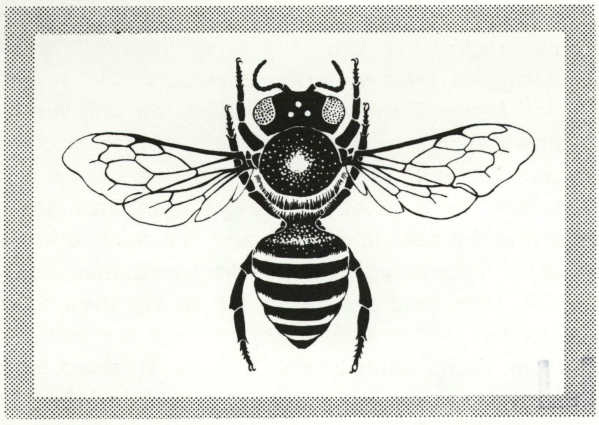

PARASITES, PREDATORS AND NEST DESTROYERS OF THE ALFALFA LEAFCUTTER BEE

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Alfalfa seed growers depending on the alfalfa leafcutting bee, **Megachile rotundata** (Fabr.), for pollination are becoming aware of the vital need for immediate action against its many enemies. With acknowledgement of the lack of detailed research on the subject, this paper is offered as an aid to growers in their fight to curtail bee losses.

PARASITES

The black chalcid wasp, **Monodontomerus obscurus** Westwood, is tinted with blue-green, and ranges between 1/8 to 1/6 inch long. The female has a long ovipositor with which she deposits 5 to 20 parasite eggs on each bee prepupa or pupa. Overwintering parasites emerge in the spring a few days before the female leafcutter bees and are strongly attracted to light. By taking advantage of these two facts, growers may control parasite populations by placing bee cells, straws or boards in a darkened enclosure (room or incubator) with a light source to attract the emerging adults so they can be destroyed. Currently this is the most serious parasite in Idaho.

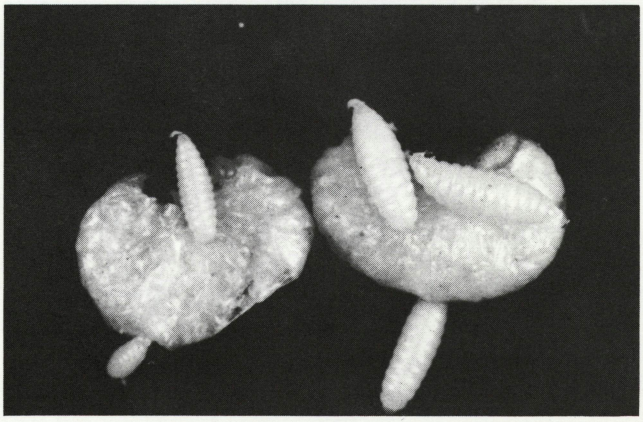
Examples of attractive lights:

1. A 25- 40- or 60-watt electric light bulb can be suspended over the center of a large pan of water within an inch of the surface. Dishwashing detergent should be added to the water as a wetting agent. Several of these light-water traps may be installed, depending on the size of the room. Upon emergence the adult parasite should be able to see the light source in order to be attracted to it. The attracted adults fly to the light source, fall into the water and are drowned. The water should be changed when necessary, usually twice a day during peak emergence.

2. A commercial insect light trap can be used which will electrocute attracted insects as they strike the electrically charged grid surrounding the light.

3. A room in a building, such as a garage or shed, can be used to house bee containers for spring emergence. The room should have a single glass window; the rest of the room should be light-proof. By using a vacuum cleaner at the window several times a day during the period of parasite emergence almost all parasites can be eliminated.

Leucospis affinis Say is a black chalcid wasp 1/3 inch long with bright yellow markings and enlarged hind legs. The ovipositor curves up and forward over the abdomen toward the head. Females lay their eggs on developing bee larvae by thrusting their long ovipositors through solid wood, soda straw paper or leaf capping plug. No controls are known. At present it is not a serious problem, however, its occurrence in bee nests seems to be on the increase.



Larvae of the chalcid parasite, Monodontomerus obscurus, and the parasitized prepupae of the alfalfa leafcutter bee. (Courtesy of Carl Johansen, W.S.U.)

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PREDATORS

Sapyga pumila Cress. is a slender, black chalcid wasp 1/3 inch long with yellow markings. Occasionally the mid-abdomen has a dark red hue. The newly hatched predator larva destroys the egg of the leafcutter bee and then completes its development on the food originally provided for the bee larva. It overwinters inside a papery brown cocoon within the same bee cell. No control is known. Occurrence of this predator is rare.

Nemognatha lurida Lec. is a yellowish-tan meloid or "blister beetle", 1/4 to 1/2 inch long. It has long, tube-like mouthparts. The female beetle places her eggs on the undersides of wild sunflower heads in clumps of 10 to 40 eggs. The newly hatched beetle larvae, called triungulins, attach themselves to bees that visit the flower thus catching a ride back to the nest. There the triungulin destroys a bee egg, consumes the store of food and overwinters in the same bee cell. Although these predators are often found in bee cells they are not considered very serious. Removal of sunflowers growing in the vicinity of the leafcutter bee domociles may be beneficial since these are the only known plants on which females deposit eggs.

Trichodes ornatus Say adults are checkered flower beetles, about 1/2 inch long and metallic blue in color with bright red or yellow markings. Their larvae are dark pink with brown heads, thoracic shields, and hook-like structures at the anal end. Full grown larvae are 3/5 inch long. It is unknown how the larvae reach the bee cell. After destroying the leafcutter bee egg the life cycle is very similar to that of meloid beetles. No control is known, however, damage is rare.

NEST DESTROYERS

At least ten species of dermestid beetles are known to infest leafcutter bee nests. The most important species are **Trogoderma glabrum** (Hbst.), **Anthrenus occidens** Csy., **Megatoma variegata** Horn and an unknown species of **Attagenus.** In a great many instances these beetles cause more damage than all other predators and parsites combined. Adults of **T. glabrum,** a pest of stored grain, are 1/10 inch long, oval in shape and dull black with 3 lines of whitish bristles across the wing covers. Full grown larvae are about 1/4 inch long and have 11 brown bands around the body. They are covered with long brown hairs. Complete development from the egg to the adult requires about 35 days at 80 F. Even at low temperatures these beetles and their larvae continue feeding. During the winter when the hibernating leafcutter bees are kept at temperatures above 40 F. the feeding damage can be extensive. Dermestid beetles are scavengers of dead animal and plant tissue, but living leafcutter bee larvae are readily consumed when contacted.

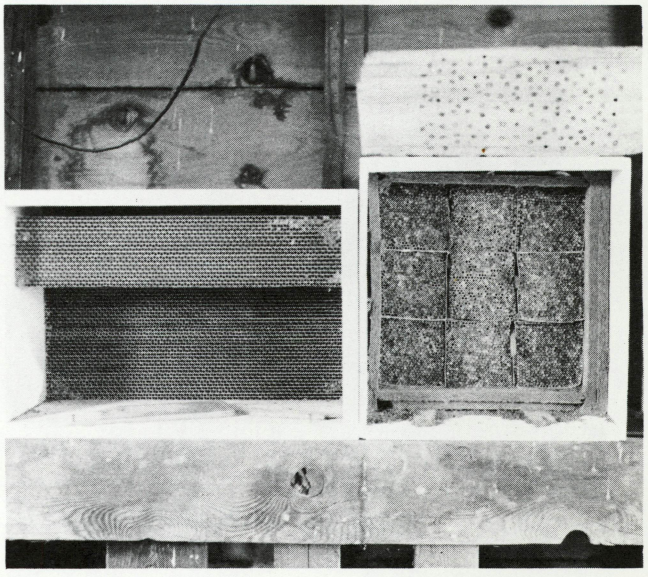
Several procedures have been tried for the control of dermestid beetles. None has been completely successful.

The practice that probably saves the most bees is the placing of over-wintering bees into cold storage. After all bee activity has stopped in the fall, the bee containers should be placed in cold storage and held between 33 and 40 F. with a relative humidity of about 50%. Because of the danger of fungus growth destroying the bees in cold storage, the relative humidity should never exceed 70%. As bee containers are removed from cold storage in the spring they should be placed in a darkened room or incubator having a light trap. Many adult beetles will be attracted to the light and be destroyed before they can re-infest bee nests with their eggs.

Another valuable practice is to prevent bees from re-nesting in highly contaminated containers. Either sterilize or burn contaminated nesting material after all bees have emerged.

Active work is underway on the possible use of an attractive bait for dermestids to which 1% DDT has been added. We still need to determine the safest method of placing baits in field domiciles so bees will not come in contact with them and be killed.

The red flour beetle, **Tribolium castaneum** (Hbst.), the black flour beetle, **T. madens** (Charp.), and other stored grain beetles are found in large numbers at some locations destroying leafcutter bee nests. Life histories and controls are generally similar to the dermestid beetles.



Alfalfa leafcutter bee domocile showing three types of nesting materials that have been used by alfalfa seed growers. Acceptance by bees: 100% wood, 95% soda straws, 5% cardboard.

The dried-fruit moth, **Vitula edmandsae serratilineella** Ragonot, is occasionally found in leafcutter bee tunnels. It is not known whether the larva consumes only pollen and leaves or whether it adds living bee larvae to its diet. The adult is gray and about 1/4 inch long. The larva (caterpillar) is white or pinkish with a brown head, prothoracic shield, and anal plate. This species is becoming fairly common and can be quite destructive. No control in bee nests has been developed.

Ants and earwigs often remove pollen from the cells during the time bees are nesting. They have been known to cause females to abandon nesting holes and sites. Control with insecticide sprays should be used with extreme caution, if at all. Finding and destroying ant nests is the best approach for ant control. Ants can be eliminated in their nests by mixing chlordane, dieldrin or heptachlor into the ant mound. Occasionally a second application will be necessary. Liquid formulations of any one of these insecticides will control earwigs and ants. Paint it on the base of the bee domicile support in a 6-inch band, approximately 10 inches above the ground. The treated portion of the support posts should be covered with burlap or other material to prevent the bees from landing on it. Seal the top edge of the burlap covering to the support post and flare the bottom edge out. Do not allow the bottom edge to touch the ground. Poison bait can be used against both ants and earwigs and is preferred to spraying.

Mice can completely destroy bee larvae in soda straws or similar materials. Birds, such as woodpeckers and sparrows, cause considerable damage on occasion. Control consists mostly of diligence on the part of the grower and exclusion where possible and necessary.

The following is a quick summary for growers to follow:

1. Maintain leafcutter bee nests in cold storage during winter followed by controlled emergence in the spring.
2. Utilize trapping devices to aid in controlling parasites and predators.
3. Use poison baits against stored product pests.
4. Clean up nesting materials and sites.
5. Renovate nests systematically.
6. Exclude birds from bee domiciles with small-mesh chicken wire.

Picture credit: Masthead drawing of alfalfa leafcutter bee courtesy Dr. G. A. Hobbs, Research Station, Lethbridge, Alberta, Canada Department of Agriculture.

USING INSECTICIDES AROUND INSECT POLLINATORS

Because of the importance of insect pollinators, farmers, beekeepers and the pest control industry are obliged to cooperate closely to reduce the losses of beneficial insects to a minimum. Many of the insecticides are highly toxic to the all-important honey bee and other pollinators. For the protection of these useful insects, it is essential that only recommended materials be used and that these be applied at the proper time and in the proper amount.

Things to Consider When Using Insecticides

—Read the label and follow approved local, state and federal recommendations.

—When using materials hazardous to bees, notify the beekeeper so that he may move, cover or otherwise protect his bees.

— Covering colonies with burlap or dark plastic material for 1 to 2 hours during and after treatment in early morning gives added protection. Colonies can be covered with dampened burlap 1 or 2 days without injury. Covering may be important when treating by airplane.

—Treating a nonblooming crop with a hazardous material when cover crops, weeds or wild flowers are in bloom in the field or close by may cause heavy bee losses. Drift to neighboring fields attractive to bees also may cause losses.

—Treating large areas with repeated applications may cause great bee loss.

—The kind and amount of insecticide used is important. Use the proper dosage of the safest material to bees that will give good pest control.

—With few exceptions, dusts are more hazardous to bees than sprays.

—Applications by airplanes are more hazardous to bees than by ground equipment because of drift deposit.

—Treatments when bees are foraging in the field are usually the most hazardous. Treatments over colonies in hot weather when bees are clustering on the outside may cause severe losses. Treatments during the night or early morning before bees are foraging are the safest.

—Location of bees is important. Colonies located in the field and treated over may sustain more loss than colonies not treated over at the edge or outside of the field. Colonies moved into fields after treatment may escape damage.

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