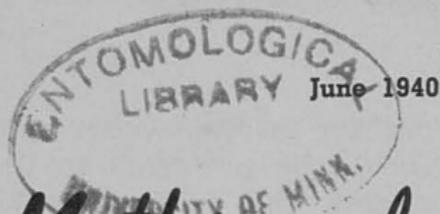


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Clothes Moths and Carpet Beetles

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CLOTHES MOTHS and carpet beetles breed in clothing and house furnishings of animal origin, such as woolen fabrics, feathers, hair, and furs. The black carpet beetle also frequently infests dried milk, dried egg, and germ meal in food manufactures, and linseed meal, dried meat scrap, and similar products in the stock feed industry. The webbing clothes moth develops in dried fish meal and a few other animal products.

CLOTHES MOTHS

Of the three species of moths known to infest woolens only the webbing clothes moth is of any general importance. Young stages of carpet beetles are frequently mistaken for clothes moths.

In its adult form the webbing clothes moth has a wing spread of one-fourth to one-half inch and is a pale cream or buff with no spots. It is not attracted to lights. The small gray and spotted moths flying around lights in warm weather are, with few exceptions, outdoor species.

The clothes moth has four distinct stages: egg, larva, pupa, and adult. The egg—white, oval, and smaller than a common pin head—is laid loosely within the folds of garments or between the fibers of loosely woven goods. It is fragile and easily destroyed by crushing.

The larva is the "worm" or feeding stage. When first hatched it is a small, white caterpillar, hardly one-sixteenth inch long and so slender and transparent that it is difficult to find. When full grown it may be half an inch long or more. Wherever the worms travel, they spin silk threads in the form of tubes in which they withdraw for protection when not feeding. These silken tunnels and webbing are conspicuous signs of their work, as are also the tiny, hard pellets of excrement left by the worms and often assumed to be eggs.

The pupa is a resting stage into which the worm changes after it has become full grown and before it becomes an adult moth. This stage is



Clothes moths with larvae and webbing on woolen blanket.

seldom noticed for it is passed in a silken cocoon more or less hidden by bits of the material in which the worm has been feeding.

The time required for moth development, from egg laying until the young moth is ready to lay a new generation of eggs varies tremendously depending upon temperature and food conditions. At average summer temperatures of 70° to 85° F. with liberal food supplies the insect's life cycle is about 65 to 90 days. Sometimes, however, the worms for no apparent reason give up feeding and remain motionless in their silken tubes for months before emerging to resume feeding and development. In such cases the insect may take as long as three years or more for its complete development. It is obvious that no definite conclusions may be made from the stage of the clothes moth or the size of the worm as to when and where the eggs were deposited. Most of the insect's life is spent in the worm stage, for under favorable conditions the egg hatches in 4 to 8 days and the pupa stage lasts 8 to 10 days.

The adult moth lives only long enough to lay its eggs, usually not over 100 or 150 in number and deposited mostly within one or two weeks of emergence. The moth cannot feed after the worm stage because it has no mouth, but it may be injurious if it produces worms.

Clothes moths develop in woolen clothing; in furniture filled with hair or upholstered with woolen fabrics such as mohair; in woolen lint and animal hair collected in cracks of the floor and baseboards, and in the vacuum cleaner; in hot and cold air shafts from a furnace; in tapestries, carpets, and rugs; in hair and feather brushes; in stuffed animals and birds and their skins and feathers; in felt hats and piano felts; and in hair or wool used in insulation and deadening felts. Cotton, linen, and silk are not used as food but may be cut through by the larvae to reach animal fibers or to provide cocoon material.

CARPET BEETLES

Carpet beetles pass through the same four stages as the clothes moth except that the adult is a beetle instead of a moth. There are two kinds of carpet beetles common in Minnesota, the most common being the black carpet beetle, the other the buffalo carpet beetle. These differ con-

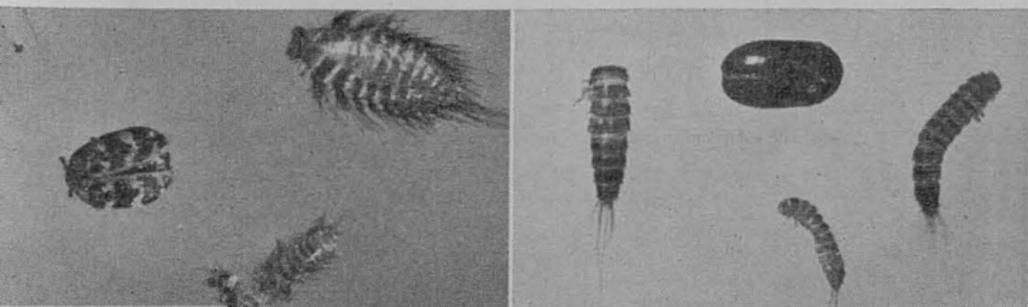
siderably in appearance, but they are controlled by the same methods.

The black carpet beetle in its adult stage is a shiny, oval, plain black beetle. Although it varies in size, it is usually about one-eighth inch long. The adults live from two weeks to a month while they lay their fragile, white eggs, possibly over a hundred in number. The worm is brown and covered with short, stiff brown hairs which lie flat and are directed toward the rear end of the body. It is slender and progressively smaller toward the rear where a conspicuous tuft of long bristles is located. In this stage the skin is shed several times, the discarded skins often being found at the point of infestation when the actual insects are not to be seen. In warm weather or in a warm place indoors, the egg will hatch in 6 to 10 days. The worm requires several months to over a year to develop depending on temperature and the type of food available. Following the worm stage and before the adult beetle appears there is a pupa or resting stage lasting from 10 to 12 days.

The buffalo carpet beetle is frequently known as the "buffalo bug" or, less appropriately, the "buffalo moth." The adult beetle, usually smaller and proportionately broader than the black carpet beetle, is black spotted with white and has a bright red line down the center of the back. The worm is shiny brown or blackish and so covered with upright tufts of black hairs that it looks like a little black brush. It is much shorter and stouter than the worm of the black carpet beetle. The buffalo carpet beetle requires nearly as long for development as the black carpet beetle.

The adults of both species are most numerous in the spring when trees and shrubs such as *Spiraea* are in bloom. The beetles, especially the buffalo carpet beetle, are attracted to sunny windows, and if they can, they will escape to the blossoms and there feed upon pollen. It is not likely that this migration takes place at any special time in adult life, hence some individuals may have laid all their eggs before they leave the house, others only part or none of theirs. It is possible that a neighbor's carpet beetles may be attracted to one's *Spiraea* blooms and thus gain entrance to the house either by their own efforts

Left: Buffalo carpet beetle with empty larval skins.
Right: Black carpet beetle with larva and skins.



or on cut sprays of the flowers. The likelihood of this way of entry as compared to others is not great enough to warrant removal of *Spiraea* bushes. Do not bring *Spiraea* into the house, however, without shaking well.

The clothes moth flies freely and deposits its eggs on woolens in dark places. The carpet beetles are not so confined to dark places, but being less vigorous fliers they are usually found on horizontal surfaces, especially the floor, sometimes on shelves and in the bottom of trunks and bureau drawers. They seldom attack hanging clothing unless it drags on the floor. Silk is liable to their attack but much less so than are woolens.

CONTROL METHODS

Low Temperature

Cold storage protects woolens, furs, and other susceptible materials from clothes moths and carpet beetles. The temperatures used are between 40° and 50° F., not low enough to kill the insects but sufficiently cold to chill them into inactivity. If an infested article is not cleaned or the insects killed by fumigation before storage, any insects present will revive even after many months of storage and go on with their feeding when brought out into a warm place.

It is impractical to lower the temperature of a storage room to the point where these insects will be sure to die. Minnesota's subzero temperatures, however, can be utilized in treating infested clothing or furniture. Because there is no way of telling how well protected from the cold the insects may be, the exposure should be as long as possible, 48 hours to a week. From the standpoint of insect control, clothing, rugs, and over-stuffed furniture that are not in use are best stored in a cool place. Clean dry storage space in a basement is usually cooler than attic storage and in some cases may profitably be substituted for the latter.

Insecticides

Four types of insecticides are used in controlling clothes moths and carpet beetles:

1. Moth crystals, such as para-dichlorobenzene or naphthalene.
2. Liquid fumigants, as carbon tetrachloride or ethylene dichloride.
3. Moth sprays, usually pyrethrum extract in petroleum oil.
4. Mothproofing solutions.

Moth crystals, vaporizing in a closed space, act as a fumigant, only more slowly than liquid

fumigants. It is not always possible, however, to maintain enough of the vapor to kill all the insects. Para-dichlorobenzene vaporizes more readily and has a more pleasant odor than naphthalene. The latter is used in storage that is to remain untouched for a year or two. Naphthalene comes both in flake form and as moth balls, the flakes vaporizing more readily but not being so easily brushed from garments. Camphor is not so good for this purpose, but it can be used. Cakes made from moth crystals and sold for use in wardrobes and trunks are not efficient. Attachments for the application of moth crystals by means of the vacuum cleaner should be looked into carefully. If the crystals themselves are ground up and blown into cracks by the machine, the attachment has possible value. If only the vapor is given out the attachment has no value because such treatment is too weak to be effective. Long breathing of the concentrated fumes of moth crystals may result in a severe headache.

Liquid fumigants are useful in the emergency treatment of infested boxes, also in treating articles not easily cleaned or those that cannot be stored. They act much more rapidly than moth crystals but do not protect for long because their vapors leak out of storage boxes within a few days. Two chemicals are convenient and relatively safe for this use in the home. One is carbon tetrachloride, a common noninflammable cleaning fluid. About two cupfuls should be used for fumigating a trunk. It will not injure clothing if sprinkled directly on the fabric. The trunk must be tightly closed immediately and kept so for 24 hours or longer. Mixtures of ethylene dichloride and carbon tetrachloride (mixed 3 to 1 by volume) are effective, one cupful being used for a trunk. The trunk should be tight and the temperature kept up to at least 70° F. Fumigation is much more effective if the temperature is 80° or 90° F. For fumigation of larger spaces the fumigant mixture is used at the rate of 14 pounds (about 5 quarts) per thousand cubic feet. Do not use carbon disulfide because it is too inflammable and explosive for this purpose.

Moth sprays, practically the same as housefly sprays, are useful for spraying the walls and floor of a clothes closet to kill insects and eggs that are still in the cracks after cleaning. The cracks may be treated even more effectively by squirting moth spray, fly spray, or even straight kerosene into them from an oil can. Gasoline should never be used because, besides being explosive, it is not so effective an insecticide as kerosene.

Mothproofing solutions are not intended for killing insects directly. They are used for treating rugs, etc., to make the fabric distasteful or poison-

ous for insects. Other methods of moth control should be preferred to the spreading of poison around the house. Furthermore, the ordinary person has not the equipment to apply mothproofing solutions properly to rugs and furniture. Mothproofing of clothing and bedding is not advisable, in fact is rather unnecessary. Some fabrics intended for upholstering furniture are now being mothproofed in the process of manufacture.

Storage of Woolen Goods

Articles in frequent use ordinarily are not damaged. If woolens are not used oftener than once a month they should then have some special protection against moths. In the case of outer wraps, suits, and dresses that are usually stored on hangers, tight garment bags are of value, especially if each bag contains not more than a single suit or two or three dresses. Woolens not stored on hangers may be wrapped separately in paper and, if laid away for long, placed in tight boxes, chests, or trunks. Not only does the wrapping make it hard for moths to find places to lay their eggs, but also infestation is not so likely to spread from one article to another.

Woolens should be clean when put away. Greasy spots are more attractive to moths than clean areas. If clothing needs dry cleaning this should be done before storage. The dry cleaner will seal clothing in tight storage bags if desired. Stored articles should be taken out once or twice a year to be brushed, beaten, and aired. Brushing and shaking out will crush or remove most eggs and worms. That clothes closet which remains the coolest in summer is the least likely to become infested.

Moth crystals should be sprinkled liberally in garment bags and between layers of woolens on closet shelves and in boxes. Several pounds of the crystals may be used to advantage each year in the average small household. The fumes of these chemicals will kill moths if they are closed up in a tight container long enough. Furthermore they have repellent action, thus helping to protect woolens stored with them.

Dispose of worthless woolen articles promptly. Frequently a forgotten discarded sheepskin hunting coat, sweater, mittens, or other such article becomes the source of a bad infestation.

Protection of Furniture

Insects damage upholstered furniture by injury to the cover or by feeding within the stuffing. Although cover injury is usually the result of external surface feeding it may be from within, especially in improperly stuffed furniture. Insect

injury is avoided largely by selecting furniture having vegetable fiber stuffing. If the cover is woolen, it should be mothproofed in manufacture.

If other factors such as the durability of the stuffing and the cover lead one to purchase overstuffed furniture that is not so protected from insect attack, he should guard constantly against infestation. Frequent and thorough brushing and vacuum cleaning not only remove clothes moth eggs, worms, and webbing from the back and sides of the cover but also carpet beetle larvae from the cracks under the cushion. Spraying thoroughly until the surface is uniformly damp with moth spray will kill insects on the surface, but this is advisable only in bad cases. If worms and the debris from their feeding begin to sift on to the floor underneath upholstered furniture, the stuffing is probably infested. The furniture must then be fumigated, a job best done by a professional fumigator. If fumigation is not possible, place the furniture in a warm, closed, unoccupied room, sprinkle with large quantities of para-dichlorobenzene crystals, and then cover the furniture tightly with several heavy blankets weighted down to the floor all the way around to seal in the fumes. For a chair, 2 or 3 pounds of crystals will be necessary. The treatment should be continued for 48 hours before opening up and airing. The remaining crystals may be swept up and used elsewhere.

Protection of Rugs

Most insect injury to rugs is by carpet beetles. Clothes moths generally work on rugs only in dark places under furniture that is seldom moved or in unprotected rugs rolled up for attic storage. Since most houses have carpet beetles working in the woolen lint under the baseboards, especially in the bedrooms, rugs need constant attention and cleaning. Carpet beetles develop slowly and injury by them is gradual unless the insects are numerous. For these reasons it is usually easy to prevent appreciable rug injury. In fact many housekeepers control carpet beetles so well by their usual cleaning routine that they never suspect the presence of these pests. In places where carpets are laid up to the baseboard and fastened down, beetle injury may become serious, the beetles being able to migrate directly into the carpet and remain there relatively undisturbed.

Special methods of control may be employed when carpet beetles become numerous enough to warrant them. The simplest method is to beat the rug thoroughly from both sides. While the rug is up and after the room has been cleaned, treat the floor cracks with moth spray or kerosene squirted in liberally by means of an oil can.

Spraying is wasteful because most of the spray is deposited on the surface where it does no good. It is of value to fill cracks with a wood-filler, etc.

Infested rugs may be sent to a fumigator, but fumigation merely rids them of insects and does not prevent reinfestation immediately after the rugs are laid down again in an infested house. This is true also of fumigated furniture.

Valuable rugs may be mothproofed to prevent injury in an infested house. Results depend upon the poison used and the thoroughness of application. The fabric must be wet through or untreated spots will be left where the insects are likely to congregate. The ordinary person is not equipped to mothproof furniture and heavy rugs. Furthermore errors are costly. An experienced and reputable firm will furnish a guarantee backed by a reliable insurance policy. Mothproof protection is gradually lost by laundering.

Many carpet beetle worms can be eliminated by trapping them in pieces of woolen cloth placed next the baseboards under radiators or furniture. The "traps" should not be neglected, or they will become breeding places. They must be taken up and shaken outdoors once every week or two.

House Fumigation

It is only in extreme cases that a house need be fumigated. House fumigation is too expensive and too inconvenient otherwise. Furthermore carpet beetles are extremely resistant and hard to reach in a general fumigation.

Commercial fumigators ordinarily use hydrocyanic acid or chloropicrin (tear gas) for house fumigation. These gases should only be employed by experienced men. In fact it is illegal in most large cities to use cyanide without a license. Fumigating with sulfur candles is not advised except when absolutely necessary because the gas corrodes metals and may injure fabrics, especially in damp places or moist weather. With hydrocyanic acid it is necessary to vacate the entire building even if only a part is under fumigation. This is usually true for the other gases mentioned although there is no danger when either the sulfur fumes or the chloropicrin is not strong enough to cause coughing or weeping. As in the case of rug and furniture fumigation, the fumigation of a house is merely a clean-up measure and does not prevent more insects from being brought in.

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