

November, 1921

Series I, No. 181-A

Colorado Agricultural College

EXTENSION SERVICE

Fort Collins, Colorado

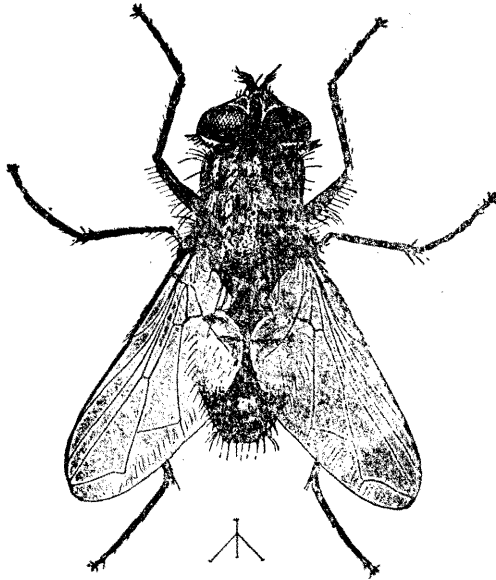
ROUD McCANN, Director

HOUSEHOLD PESTS

By

CHAS. R. JONES

Assistant Entomologist Experiment Station



House fly (*Musca domestica*) adult (from Marshall)

CO-OPERATIVE EXTENSION SERVICE IN AGRICULTURE AND
HOME ECONOMICS—COLORADO AGRICULTURAL COLLEGE
AND U. S. DEPARTMENT OF AGRICULTURE CO-OPERATING

Distributed in Furtherance of Acts of Congress of May 8
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THE HOUSE FLY

The common house fly, so called because of the exceedingly large percentage of this species present in the number of flies that inhabit houses is, on the whole, the worst and most annoying pest we have to contend with. It is not only annoying but is dangerous to have around, as it is instrumental in conveying several kinds of infectious diseases.

This pest is rather persistent in awaiting an opportunity to enter kitchen or dining room, and will contaminate eatables with germs that have been picked up thru filthy habits.

Until recent years flies were considered as valuable assets, owing to the amount of decaying organic material they were instrumental in destroying. Later investigations have proven them a great menace in distributing pathogenic organisms. It has been conclusively proven that flies are instrumental in carrying and disseminating the germ organism of cholera infantum, typhoid fever, tropical dysentery and several other infectious diseases. They are not only capable of becoming contaminated and carrying the germs on their bodies and feet, but they also convey them in their alimentary tract, and distribute them in the fly "specks" to articles of food.

Flies breed with surprising rapidity and will propagate in any filth, decaying vegetable and animal matter or excrementous materials. Horse manure is a favorite breeding material. Herms* gives the following on breeding habits:

"To gain an estimate on the number of larvae developing in an average pile of horse manure, samples were taken after four days' exposure to the flies, and the following results were obtained: In four samples, a total of 15 lbs., there were 10,282 larvae. All of the larvae were quite or nearly full grown. This gave an average of 685 larvae per pound. This would give an average of over 900,000 fly larvae per ton. This particular manure pile was only one of the many known cases to exist in various parts of the city.) No wonder flies fairly swarm in the vicinity of these choice ornaments. Estimating that one adult fly deposits from 120 to 150 eggs with at least six lots at intervals of from three to four days, Hodge gives us the following astounding statement: 'A pair of flies beginning operations in April may be progenitors, if all were to live, of 191,010,000,000,000,000,000 flies in August. Allowing one-eighth of a cubic inch to a fly, this number would cover the earth 47 feet deep.'"

Under ordinary circumstances, it can be safely said that, when

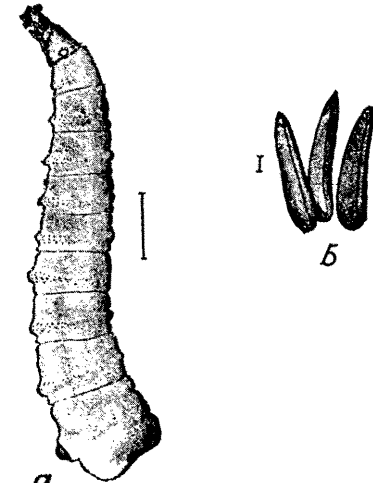
* Medical and Veterinary Entomology—Herms—1915—page 165.

flies occur in abundance, they have been bred in the immediate or closely associated vicinity. The house fly can fly and under favorable conditions may be carried considerable distances by the wind. This, however, is somewhat prevented, due to the habit of the insect of seeking protected places when the wind begins to blow.

LIFE HISTORY

Beside annoying animals and human beings and in view of the fact that the house fly is instrumental in the transmission, or is a carrier of the organisms of several infectious diseases, it is a pest of extreme importance from an economic and medical standpoint. Its life history and habits are such that it is afforded the best possible chance to obtain the pathogenic organism and transmit it to the food of man, thereby causing a great deal of suffering and loss of life. A vigorous campaign, either for permanent or temporary control, cannot be too strongly urged.

The house fly passes thru four distinct stages: egg, larva (maggot), pupa (or resting stage) and adult. Each female will deposit from 75 to 150 eggs in from three to four days and usually in excrementous materials or garbage. Horse manure is the favorite material in which the eggs are laid and upon which the larvae develop most



House Fly (a) Full grown larvae; (b) rapidly.
Eggs, greatly enlarged (from Marshall).

The period of incubation is from 12 to 24 hours; the larval stage from four to six days. The pupal stage varies from three to four days and the adults begin to oviposit again in three to six days after emergence, completing the life cycle in approximately two weeks. This depends of course upon the climatic and food conditions. There are possibly ten to twelve generations a year.

CONTROL

Aside from the annoyance, loss of life, etc., the house fly is of considerable economic importance. The annual loss to man runs into astounding figures. Dr. Howard estimates that the cost of screening in the United States is over ten million dollars annually, while over two million dollars spent yearly in fly traps, sticky fly-paper and fly poisons.

Sanitation and prevention are the principal steps in fly control. All manure piles should be protected or disposed of to prevent flies from breeding in them. This can be accomplished by having a tight box receptacle for barn disposals or by scattering the manure on farms before the flies have had an opportunity to develop; or it may be treated with insecticides either to prevent fly breeding or to destroy the larvae or maggots. It may be drenched with kerosene emulsion at the rate of one to five; 40 per cent Boracic acid; 3 per cent creolin; or treated with chloride of lime.

As flies breed in any filth, care should be taken to see that all garbage is properly disposed of and that the garbage can has a fly-proof lid to prevent the flies from ovipositing in it before the refuse is properly disposed of. **Destroy all breeding places and effect a complete control.**

Fly traps, screens, etc., are temporary, remedial measures and only serve to protect from the adult fly. They can be likened to placing a bucket under a leaky roof. Whenever it rains you catch the water. Why not mend the leaky roof?

In addition to screening houses for temporary fly control, and in the event that the breeding places cannot be destroyed, the following preparations may be used and are easily compounded at home:

Fly-tangle: A sticky fly-paper which will almost take the place of tangle-foot, may be made by melting one-half pound of rosin and adding enough olive, castor, or lard oil to give it the consistency of molasses. With a brush spread this mixture on small sheets of wrapping paper, leaving about one inch margin all around. Place two sheets with the sticky sides together and when desired for use pull them apart. This acts as tanglefoot and may be used to detour other insects.

Poison Fly-paper: A very convenient poisoned fly-paper which acts as "dead shot" may be made as follows: 6 drams of chloride of cobalt, 2 ounces of brown sugar, 1 pint of boiling water.

When the chemicals are all dissolved, saturate a blotting paper in the solution and allow it to dry. When necessary to use, place small pieces of this paper in saucers with water. The stock solution may be kept in a bottle and used by mixing a little of it with water. The bottle should be labeled "poison."

Formaldehyde: An easily prepared poison for flies can be made by adding a little vinegar or milk to a two per cent solution of formaldehyde. This should be placed in flat dishes in various parts in the room.

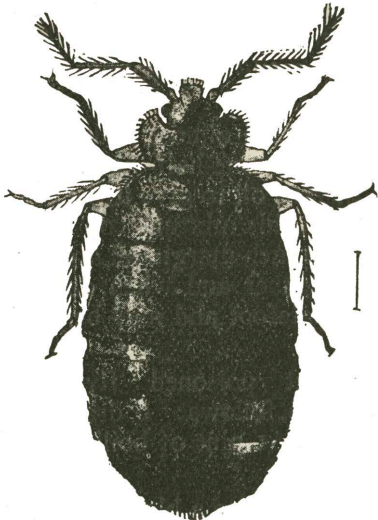
Laudanum mixture: Another poisonous mixture is made as follows: One teaspoonful laudanum, one-half teaspoonful brown sugar, 2 teaspoonfuls water.

Use in the same manner as formaldehyde or poisoned paper.

The last three are every dangerous and should be kept away from children and animals. The necessary articles for any of the above may be purchased in any drug store at a reasonable price.

THE BED BUG

The bed bug is a cosmopolitan, household pest and is a disgusting parasite living almost entirely in human habitations when occupants are indifferent or careless, hiding away during the daytime in cracks and crevices, coming out and feeding during the night.



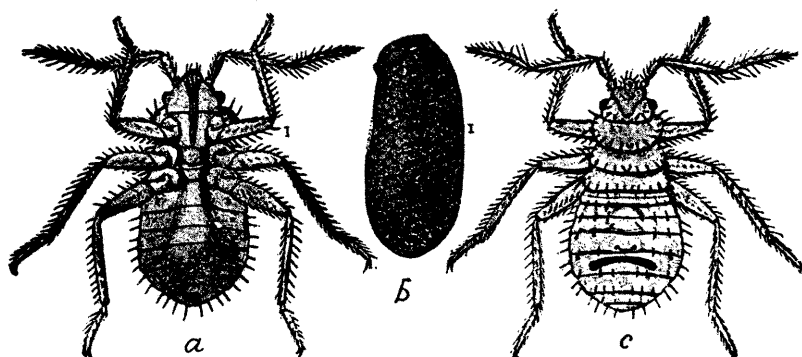
Bedbug (*Cimex lectularius*) adult female, greatly enlarged (from Marlatt).

The careful housekeeper generally considers it disgraceful if her premises are invaded by this pest. The presence of this insect is not necessarily an indication of carelessness or neglect, as it may often gain access in spite of the best of care. Nor is it a disgrace to have bed bugs, but it should be considered so to allow them to remain. People traveling are very apt to accidentally pick up this pest, either on their person or baggage, and thus introduce it into their homes, or premises may become infested by migrating insects from some nearby infested house.

The true bed bug is wingless and has a broad, flat body. This enables it to seclude itself in small cracks and crevices in the bed or wall where it remains during the daytime, coming out at night to obtain food. One of its striking characteristics is the peculiar, pungent odor so well known to all people who have come in contact with this pest. This odor is produced by a volatile fluid which is emitted from a pair of glands at the base of the hind legs.

LIFE HISTORY

The eggs of bed bugs are pearly white, oval objects, slightly bent near one end which is covered by a small cap. They are about 1-25th of an inch in length and are laid singly or in small groups. A single female is capable of laying from 75 to 200 eggs. These are deposited at intervals during a period of from two to three months, extending thruout spring and summer. The period of incubation in warm weather is from six to ten days; cold weather retards hatching and freezing weather is very detrimental to the eggs. Upon hatching the young bed bugs closely resemble the



Bedbug (a) and (c) Newly hatched bedbugs; (b) Egg, greatly enlarged (from Marlatt).

adults, except in size, and it requires from one to eleven months for this pest to reach maturity, during which time it molts five times. The time required for development depends upon food and climatic conditions.

CONTROL

The normal life of the bed bug is about three months. But without food, as in the case of vacant houses, it can live for a very long time.

On account of its habits of concealment, it is usually beyond the reach of the ordinary remedies, such as pyrethrum, insect powders, etc., but it may be effectively controlled by using gasoline, burning sulfur or fumigation.

The best and most effective method is by fumigating with hydrocyanic acid gas, and any premises may be completely rid of the pest by the use of this method. However, there is danger of a reinfestation, and should this occur the cyanide treatment would again have to be used.

Hydrocyanic acid gas is formed by the combination of sulphuric acid, water and potassium or sodium cyanide in the follow-

ing proportions: Potassium cyanide, 98 per cent pure, 1 ounce; sulphuric acid, commercial, 1 fluid ounce; water, 3 ounces. These proportions should be closely adhered to as, by adding a greater or lesser amount of water, the amount of available gas that can be liberated from any given quantity of cyanide is reduced in proportion.

Determine the cubical contents of the premises desired to be fumigated, and carefully weigh out the materials in the above proportions, using at the rate of one ounce of potassium or sodium cyanide for each one hundred cubic feet of space. See that all the windows are tightly closed and that the cracks in the doors are covered with paper. Arrangements may be made by the use of strings to touch off the fumigating loads simultaneously. However, in the ordinary dwelling this is not necessary.

In preparing to fumigate, the water and sulphuric acid should be first mixed by slowly pouring the acid into the water. Never reverse this operation as there is great danger of the operator getting burned. While the solution is still hot, add the potassium cyanide. After proportioning the water and acid and placing the proper amount in each container, the cyanide should be put in a small paper bag and if the house is two stories high, begin at the top and touch the loads as you go down.

The operator should take great care not to breathe in a room after the cyanide has been added to the water and acid. The house should be closed and a danger sign placed on the door. The fumigation with this gas should continue at least twenty-four hours, and arrangements should be made so that the windows and doors may be opened from the outside. After the house has been aired for at least one hour, a person may enter it without danger. Always use earthen jars as generators, as glass is too fragile and the acid will act upon iron or tin.

The above instructions should be carried out with care, and the operator should not breathe any of the fumes, as they are a deadly poison and there is no antidote.

Sulfur and carbon bisulfide are also good fumigants, and may be used effectively. The burning of sulfur furnishes sulfur dioxide which has long been a standard gas for the destruction of insects, and should be used at the rate of 4 pounds of stick sulfur to 1,000 cubic feet of space. These candles are standard and can be purchased at any drug store. The premises should be subjected to the fumes from twelve to twenty-four hours.

The chief objection to using sulfur in fumigation is that the gas is generated by fire and the fumes have a strong bleaching and tarnishing power, and they are not as effective as the cyanide fumes.

Carbon bisulfide is applied at the rate of 1 to 1 1-2 ounces to 100 cubic feet of space. It is very easy to handle as the liquid is simply poured into open dishes and allowed to evaporate. This gas is heavier than air, consequently the container should be placed near the ceiling. Care should be taken not to bring any kind of fire in contact with the fumes as they are very inflammable. Even a lighted cigarette or cigar or the spark from an electric fan is sufficient to explode them. It is, therefore, a rather dangerous substance to use.

There are several points in favor of hydrocyanic acid gas treatment. It is generated without fire, is comparatively cheap, non-inflammable, non-explosive, non-bleaching, does not tarnish silver nor injure household goods or eatables. It leaves no odors, is lighter than air, and very penetrating. It can be used at any time during the night or day and is fatal to all animal and plant life when applied in sufficient proportions.

THE COCKROACH

There is no more offensive insect that frequents the home than the common cockroach. This insect has long been known as a household pest and today is cosmopolitan, occurring in greater numbers in the tropics and semi-tropics. However, it is to be found in dwellings, restaurants, bakeries and hotels in the northern districts.

This pest is closely allied to the grasshoppers of which there have been described upwards of five thousand species, but few of these are troublesome in houses. In various localities cockroaches go by local names such as "roaches," "cockroaches," "croton bugs," etc.

The ordinary house roaches of today undoubtedly have been associated with man from time immemorial and have followed or been transported by common carriers to all civilized countries.

Two species rarely occupy the same house.

Cockroaches are of importance as household pests and disease transmitters only. In the dwelling, their appetite varies, and they have been known to eat and destroy clothing, books and pictures, and even to attack sleeping persons.

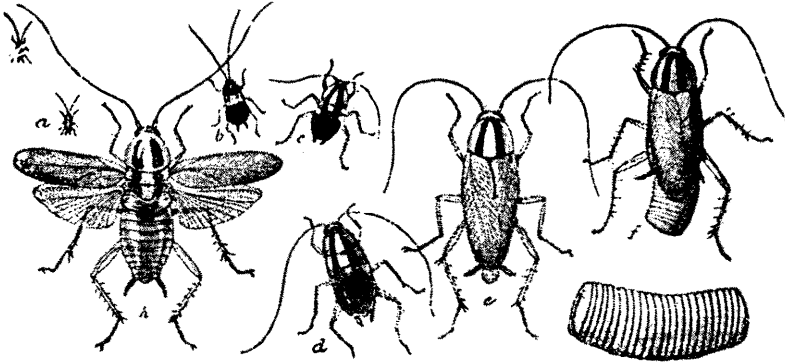
Their principal diet is starchy foods such as bread, cake, pastry in general, bananas and the like.

In restaurants and hotels, the roaches congregate in kitchens or where there is an abundance of moisture and warmth and where it is not overly clean. They emit a noxious odor and in some cases

the food they touch becomes unusable because of the odor that is imparted to it by the scent-glands of their bodies.

LIFE HISTORY

The life history of the house roach is very similar in all species. The eggs are deposited in cases in a somewhat curved, oblong, leathery pod, which contains two rows of eggs. This capsule often protrudes from the tip of the female's abdomen and is thus carried for a considerable length of time. Just before hatch-



The Common Cockroach (*Ectobia germanica*) (a, b; c and d) young cockroaches; (e) adult; (f) adult female with egg case; (g) egg sack, enlarged (from Riley).

ing, the eggs are glued in some crack, under the table or to a fold in clothing where they hatch. The young cockroach closely resemble the adult in general, but is smaller and without wings. It is a very lively runner and lives gregariously. During its development it molts several times and with the last molt the wings appear.

The development from egg to adult is rather slow, the time depending upon food and climatic conditions. In our climate there is probably only one generation a year, while in the tropics there are more. The natural ability of the roach to protect itself from enemies and remedial measures insures an abundance of the pest at all times. It is semi-nocturnal in habit, hiding in the daytime in cracks and crevices around the kitchen sink, tables, etc., and appearing in large numbers in the evening when all is quiet, scampering away to places of concealment at the least provocation.

CONTROL

There are innumerable remedies which have been suggested for the control of roaches, such as fumigation, insect powders, repellants, poisons, traps, etc. Some are very efficient and, if properly applied, will give the desired results, while others are only

temporary. Prevention and cleanliness are the two most important factors. But after an infestation has once been established, it takes persistency to effect a complete control.

In cases of moderate infestation, poisonous substances may be used, such as a **mixture of phosphorus and sweetened flour**, containing 1 to 2 per cent phosphorus. This paste is spread upon bread and set about pantries where it is easily accessible to the roaches.

Shelves or infested places may also be **dusted with Pyrethrum powder, sulfur or sodium fluoride**. In cases of severe infestation, the houses may be **fumigated with hydrocyanic acid gas, carbon bisulfide or sulfur in the following proportions**: Hydrocyanic acid gas; 1 oz. of cyanide to 100 cu. ft.; carbon bisulfide, 2 oz. to 100 cu. ft. and sulfur, 4 lbs. to 1000 cu. ft. of space to the rooms treated.

For directions for application, see "The Bed Bug," in a previous chapter.

ANTS

There are several kinds of ants that infest houses. Some gain entrance from the outside and others actually dwell within the house. Both are more or less of economic importance and cause annoyance to the housewife.

A small, red ant of the genus *monomorium*, has become thoroughly domesticated and spends his entire existence within the house, having its nest in the walls, beneath the flooring, or in any favorable location available. The small, black ants generally have their nests outside the house and gain entrance thru some opening.

None of these ants are injurious to household goods, but in most cases, they are in search of food. They easily find their way to all edibles and can very often be seen marching in a distinct line from the food supply to their nest.

Ants have a faculty of transmitting the news, so to speak, of the discovery of food to the colony and, in a very short time, the premises will be swarming with these unwelcome intruders.

LIFE HISTORY

The life history of these ants is practically the same. They are social insects, having a definite organization, living in colonies and all working for the good of the community with a systematized division of labor. There are three distinct castes found in each colony, females, males and workers, the last group being the greatest in number. The males and females may be winged while the

workers are wingless. If a colony is opened all castes may be observed.

The eggs are deposited in surprisingly large numbers, are minute, oval, whitish objects and are cared for by the workers. The young ants or larvae are fed much as the worker bees feed young bees. In due time the larvae pupate and the young ants emerge.

New colonies are started by winged females flying to a new and suitable location where they tear off their wings and set about to establish a new nest.

CONTROL METHODS

In controlling ants, the minute red species that establish its colony within the house, will be found to be the most difficult to handle as its places of abode are rather hard to get at and there is no means of locating them except by following individuals back to their point of entrance. If this be in the wall, kerosene may be injected so as to reach the colony, or, better in some cases, a small amount of carbon bisulfide may be used. Unless the colony can be reached and destroyed, the control will only be temporary.

The larger, black and red ants usually have their nests outside the house and may be easily located and eradicated.

Ants are often located under the sidewalks, where their colonies are large and are easily exterminated. When a nest can be exposed, the ants may be killed by the use of hot water or with an application of coal oil.

A good way to trap them is to moisten a sponge with sweetened water and place it where the ants will find it. Generally, in their runway is a good place. The ants will collect in the sponge in great numbers and it may then be dipped in boiling water and the ants killed. After the sponge has been washed to free it from the dead ants, it may again be moistened and placed as a trap. This is rather a slow process of trapping this pest but in the course of a few days the ants will be greatly reduced.

In cases where the nest can be located in or near the house, several measures against them may be used, such as applying **kerosene or boiling water directly upon the nests**, or, better still, make a hole about six inches in depth with a sharp stick or bar and pour in two or three tablespoonsfuls of **carbon bisulfide**, depending upon the size of the nest. Close the hole quickly and place a wet blanket or a few shovels of earth over the nest, so the fumes will penetrate the surrounding ground and destroy the insects.

One of the most reliable ways of poisoning ants is to use **equal parts of tartar emetic and sugar**. Moisten this with enough water to make into a syrup and pour into shallow dishes and set

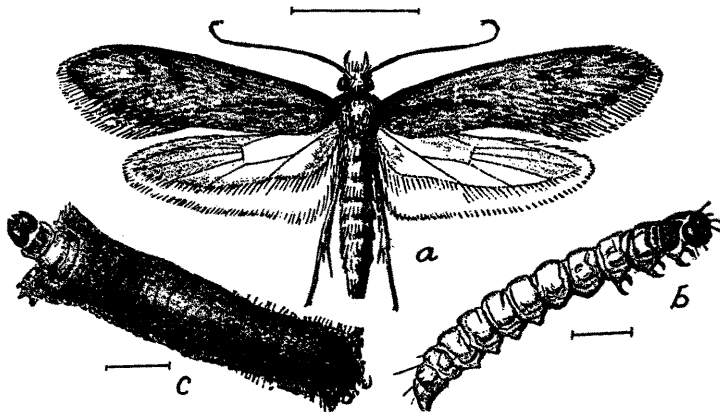
them in the runways of the ants. They will eat very freely of this, and as the poison does not act quickly, it is carried to the burrows and fed to the larvae. In this way the old and young die together, and a large colony is soon disposed of. In case the water dries out of the dish, more may be added, as this mixture does not spoil.

THE CLOTHES MOTH

The most destructive insect to woolen goods and furs is the well-known clothes moth. Many people are familiar with the results of the work of this pest, but very few really know what the insect looks like. The damage is done by the larvae or young of the insect. The moths are small, yellowish- or buff-colored insects and are discernible when disturbed from some garment or at night, flying around the lamp. They are themselves harmless when it comes to damaging any products, as their mouth parts are suctorial and they live on the nectar of flowers.

LIFE HISTORY

There are three common species of clothes moths that do damage in this country. The larvae are small, dull-whitish caterpillars and are protected by a movable case away from which they are never seen. As they increase in size, the case is enlarged in proportion, both in length and width. The color of the case de-



The Clothes Moth (*Tinea pellionella*) (a) adult; (b) larva; (c) larva in case, enlarged (from Riley).

pend upon the color of the fabric upon which the larvae are feeding.

When the larva becomes full grown, the case is attached by silken threads to the garment or material upon which it has been feeding or to the adjacent walls, and undergoes the transformation from larva to chrysalis and adult. This takes about three weeks. The moths hide away during the daytime and when disturbed can be observed running and concealing themselves in the folds of the garment upon which they occur. They are rather short lived and soon die after depositing their eggs.

CONTROL

Unfortunately there is no definite satisfactory method of eradicating this pest after it has once been introduced into the household. It requires constant and frequent inspection of garments when it has become troublesome.

Prevention is the best remedy. Sunlight and fresh air are among the best available agents for its control. Garments should be thoroughly brushed and aired before they are stored. This is to dislodge the eggs and remove the larvae that might be on them. The clothes can then be packed away with some repellent such as camphor, tobacco, moth balls, or in a cedar chest. These will prevent the adult moths from laying eggs on clothing thus treated. It must be remembered that the odors from the above substances will have no effect upon the larvae which really do the damage, but simply has some effect on repelling the moths, thus avoiding a new infestation. The garment must necessarily be free from eggs or larvae before it is put away.

When upholstered furniture becomes infested with this pest, the hydrocyanic acid gas treatment would have to be applied. (See "The Bed Bug" in a previous chapter.)

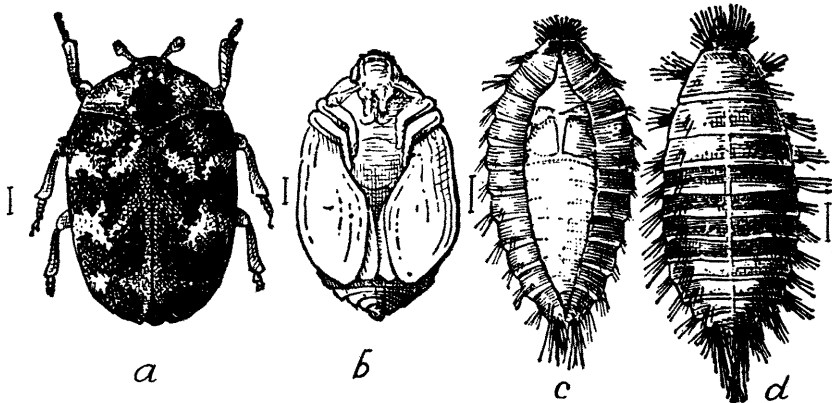
When a cold storage plant is available, unused woolen garments, furs or carpets may be stored there during the summer months with absolute safety from damage from this pest.

THE CARPET BEETLE

In a great many parts of this country the "Buffalo Moth" or carpet beetle does considerable damage to woolen goods. The term "Buffalo Moth" is somewhat misleading as this pest is not a moth but a beetle. The damage is done by the young or larvae, and the period in which the damage is greatest is in the summer and fall. However, in well-heated houses the depredation may continue throughout the entire year.

LIFE HISTORY

The adult is a small, broad, oval, blackish beetle with an irregular, reddish stripe down the middle of the back. It is a day flyer and may be found feeding upon the pollen of the golden rod and other flowers. It is not at all injurious in this stage. The young or larvae which feed upon the woolen goods are very active, brownish worms about one-fourth of an inch in length and are covered



Buffalo Moth (*Anthrenus scrophulariae*) (a) adult; (b) pupa; (c and d) larvae, all enlarged (from Riley).

with stiff, brown hairs which are longer along the sides and ends. They work in hidden or protected places, cutting carpets and other woolen goods.

The adults enter the houses thru cracks or crevices and deposit their eggs which later hatch into the small larvae described above. If there is plenty of food at hand, these larvae develop quite rapidly, pupate, and adult beetles emerge. This may, in badly infested, well-heated houses, commence in the fall and continue thruout the winter and following spring.

In houses where carpets are tacked to the floor and allowed to remain for a long period of time, the beetle, if introduced, will remain undisturbed and conditions will be favorable for a great increase of the insect. Where rugs are used and are often taken up and shaken or beaten, there is little danger of damage from this pest.

Furs and woolen goods should not be allowed to remain a long time without being moved or packed with some repellent.

CONTROL

There is no set remedy that can be applied to keep this pest in check. **When it has once gained entrance to a house, it requires**

diligent and long-continued measures to eradicate it. The carpets should be taken up and thoroughly beaten out of doors, sprayed with benzine, and allowed to air in the sunshine for several hours. All rugs will require frequent airing. The rooms should be thoroughly cleaned and dusted and the floors washed with hot water. The cracks should be thoroughly cleaned out and kerosene or benzine poured into them. The underside of the base boards should be sprayed with benzine. Care should be taken in this treatment as benzine is extremely inflammable. Two house cleanings would be preferable to one.

Prevention is the best remedy when it comes to the care of furs and woolen goods. These should be thoroughly cleaned and exposed to the sunlight as long as practical in early spring, either April or May. Then they may be packed and a repellent, such as moth balls, tobacco, camphor, etc., may be placed with them. In cases where the insect has already gained access, these repellents are of little value but they will, however, prevent the beetle from depositing eggs in goods thus treated.

In places where no receptacle is handy, the thoroughly brushed clothes may be hung in closets, but they will have to be examined and brushed at least once a month during the summer and, if necessary, exposed to sunlight.

Cold storage will also keep this pest from damaging fur and woolen goods.

LARDER BEETLE

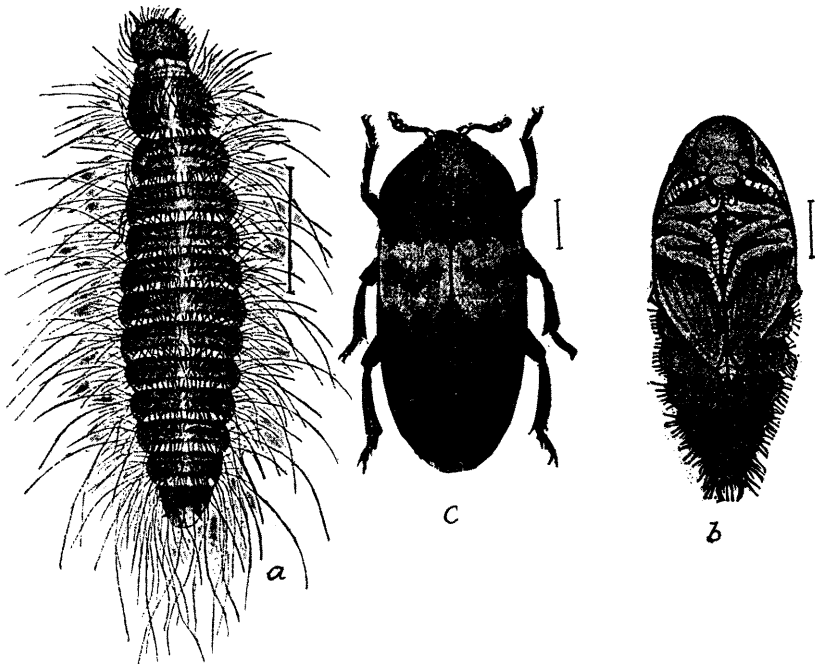
It is not an unfrequent occurrence during May and June for this office to receive inquiries relative to this bug or beetle that is often found in cupboards. It is commonly known as the larder beetle and often proves a troublesome or rather annoying pest to the housewife.

This insect has long been known in the United States and now seems to occur in all parts of this country.

LIFE HISTORY

The adult is a dark brownish beetle about one-fourth of an inch in length with a light brownish cross band at the base of the wing coverings. On this band there are six, small, black dots, three on each side of the middle line.

This insect belongs to the same family as the carpet beetle but the food habits are somewhat different. Instead of feeding upon woolen goods, it attacks ham, bacon, cheese, hides and, in fact, any



The Larder Beetle (*Dernestes lardarius*) (a) larva; (b) pupa (c) adult, all enlarged (from Marlatt).

dried product of animal nature. The adults enter houses during May and June and deposit their eggs upon some food material. The eggs soon hatch and the larvae also feed upon whatever meat products happen to be stored in their reach. They are triangular, brownish, hairy worms and when full grown are about one-half inch in length and run about the pantry quite freely. They do not burrow into hams or bacon but simply feed upon the outside.

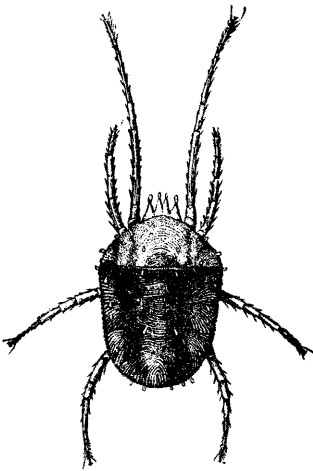
CONTROL

Trapping and hand picking are probably two of the best methods of controlling this pest. This, of course, applies where the infestation is not too great. This may easily be accomplished by exposing a small piece of cheese as a trap bait and collecting and destroying the beetles that are attracted to it. The adults are somewhat fond of cheese and will soon congregate around it in considerable numbers. If this is practiced for several days, it will prove very effective. Care should be taken to see that all pieces of cured meats such as small pieces of ham and the rinds are cleared away, and no organic material should be left exposed for this insect to breed in.

In cases where hams, bacon and other products are stored, and infestations are sufficient to warrant, the quarters may be fumigated with carbon bisulfide. (See "The Bed Bug" in a previous chapter.)

THE CLOVER MITE

The common clover mite is a small pest that is well known to most housekeepers and has long been known as a pest to flowers in gardens, clover and fruit trees. In the early spring and fall it frequently enters houses and becomes very annoying. The life history and habits are such that, during the early spring, the over-wintering adults begin to migrate in search of food or for other causes, and they often enter dwellings where their presence makes it very annoying to the housewife. The mites do no damage as a human parasite but their appearance on windows and walls of the home cause no little alarm.



The Brown Mite (*Bryobia pratensis*) adult female, greatly enlarged (from Riley and Mariatt).

LIFE HISTORY

This pest is a minute, reddish-brown, spider-like object about the size of the henhouse mite, but has remarkably long legs. It is closely allied to the two-spotted greenhouse mite or true red spider, but it passes thru its entire life history out of doors.

This mite lays its eggs on the bark of various trees, such as apple, pear, plum and cottonwood, and in this climate, the winter is passed largely in this stage. However, many of the adult mites hibernate under the bark or in other sheltered locations, and it is these adults that get into the houses.

The eggs are laid promiscuously on the bark and may be in masses two or three layers deep. They are of a reddish-brown color, giving the places of deposition a rusty appearance. The eggs hatch early in the spring and several generations may appear during the year.

In cases where the mites enter houses, it will be found that they come from some nearby vegetation and usually from the lawn or some nearby tree.

CONTROL

After they gain entrance to the house, the only practical method of eradicating them is to apply liberal quantities of insect powders of sulfur, fumigating with hydrocyanic acid gas or burning sulfur. A benzine spray could be used but this would probably be too expensive.

If the invading mites are discovered on the outset, they may be stopped by a liberal spraying of kerosene emulsion applied to the surrounding lawn. Kerosene emulsion is prepared by using:

One-half lb. soap, 1 gal. water, 2 gals. kerosene.

First dissolve the soap in the water by boiling, then remove this solution from the fire and while still hot add the kerosene. The liquid should then be pumped back into itself for at least ten minutes or until it has a creamy consistency. This stock solution may be diluted with 10 or 15 parts of water.