UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
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Control of Household Insects

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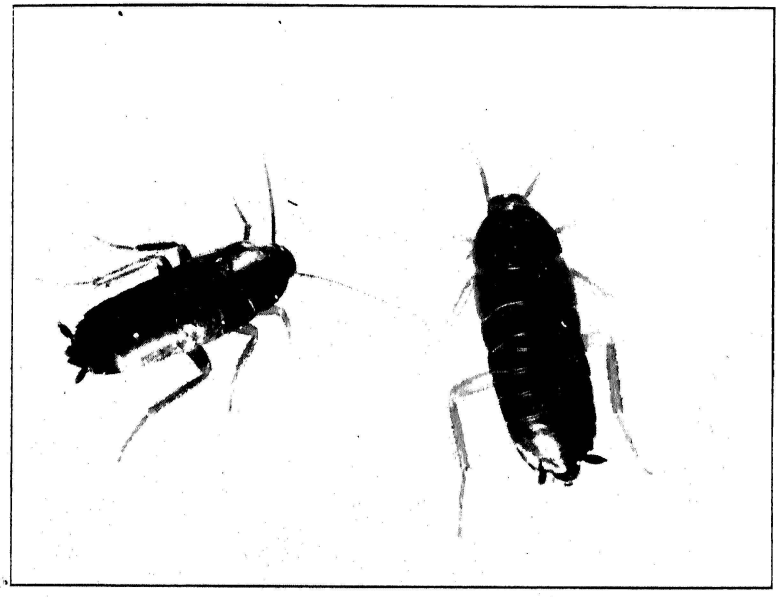

Fig. 1.—Immature stages of one of the common household cockroaches.

Of all the hordes of insect enemies that beset mankind none deserves more serious consideration than those of the household. They attack not only man's abode, his raiment, and his food, but they even threaten his health by spreading various diseases. While they form a relatively small group of pests, some of man's most dangerous enemies are included among their numbers.

In order to meet the growing demand for information on this group of pests and means of preventing their ravages, this report has been prepared. Only the most important species of household pests will be considered.

INSECTS WHICH MAY ATTACK THE HOUSE

A few insects are able to feed on the dry seasoned wood of buildings and by so doing they often seriously damage them. In this group should be mentioned especially termites and powder post beetles, though occasionally ants and large wood-boring beetles are also found damaging woodwork of buildings.

Termites.—Under Missouri conditions the termites which attack buildings are of the ground-inhabiting type. These establish their central nest somewhere in the soil or in submerged timber where moisture conditions are favorable for living and breeding. Normally the nest is not found in the woodwork of the building being attacked, though the escaping swarms of winged males and females may at times issue from woodwork in the house. It is only the workers that go up into the woodwork of the building and damage it. All that is necessary, therefore, in protecting a house from termites is to prevent the workers from making contact with the woodwork.

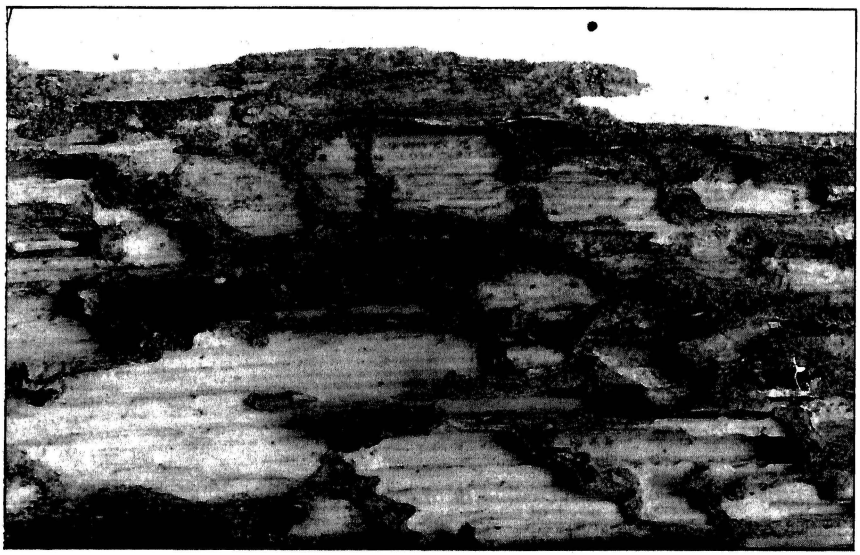

Fig. 2.—Typical work of termite on oak flooring. In time they will do serious damage to woodwork and the heavy timbers of buildings.

Worker termites damage a house or other wooden structure by chewing away the softer grain of the wood, using it as food for the colony. If not controlled, a colony of termites may do much damage to a building. As soon as it is known that they are working in a building, steps should be taken to eliminate them.

Control: Since Missouri termites normally live underground, usually outside the foundation walls of the building, it is necessary for the workers to make contact with the timbers from their subterranean tunnels.

In most cases, where this occurs it is due to faulty construction of the building. Woodwork very often is permitted to come in contact with the soil, providing easy access for termites. Basement window sills, wooden porch supports, lattice work on porches, form timbers on concrete foundations, and heavy basement supporting posts with the concrete floor poured up around their bases are the most likely means by which termites reach the sills, joists, and other woodwork of buildings. Infested buildings, therefore, should have these sources of entrance carefully checked.

Other sources of trouble are settling cracks in foundation walls, in which termites may run their moistureproof tunnels up to the sills; concrete porches with earth fill on a level with the first floor joists; and unexcavated portions of basements or where the house has no basement and its sills and joists are only elevated a foot or so from the ground level.

Property owners should have their homes and other buildings carefully examined and any faulty construction corrected, whether the building is already infested with termites or not. If termites have not yet found these easy means of reaching the woodwork of a building, they are certain to do so and it is always better to prevent than to clean up an infestation.

Do not permit any woodwork to touch the soil. Build an airway at low basement windows, saw off basement supporting posts above the level of the basement floor and build concrete supports beneath them, seal completely through the foundation wall all settling cracks and provide plenty of light and ventilation under houses which do not have basements. Any mechanical barrier which can be placed between the termites' subterranean tunnels and the woodwork of a building is cheaper and usually a better protection than soil or timber treatment later. In new construction a non-corroding metal shield fitted over foundation walls makes an effective termite guard. However, there are cases where mechanical barriers are not possible and in such cases a chemical barrier must be used.

A house that is infested should be carefully checked to determine where the termites are getting in. If possible, prevent them from continuing to reach the woodwork with mechanical means. If not, remove affected timbers and replace with new that are thoroughly treated with creosote or other standard wood preservative. Then treat the soil at the point or points where the termites have run their tunnels up over footings or foundation walls or where they go directly into the wood from their subterranean tunnels. For this purpose some use insoluble forms of arsenic, fluorine compounds, creosote or other coal tar by-products.

In some cases, it is necessary to treat the soil all the way around on the inside of the wall of buildings or portions of buildings which are not fully excavated. Also where they make contact with sills and joists from under earth-filled concrete porches the soil under the porch next to the foundation wall of the house should be treated through holes drilled through the concrete floor of the porch.

It is not necessary to pay an exorbitant price to have a house treated

for termites. Most cases can be handled at small cost by the owner and a good carpenter. More involved cases may call for expensive repair work and the help of a specialist equipped to treat soil and timbers with termite-proof chemicals.

Powder Post Beetles.—These small beetles and their pale, boring grubs often show up before one has scarcely finished the woodwork in a new home. In such cases, the seasoned timber is usually infested as it comes from the lumber yard. Again they may be brought in with new

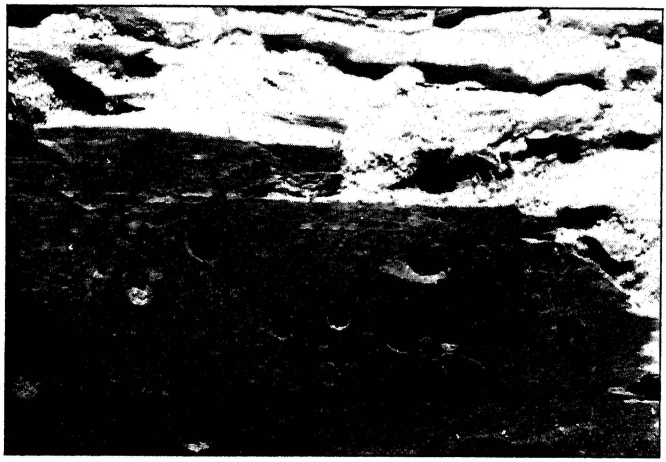

Fig. 3.—Powder post beetle injury showing almost complete pulverization of a piece of flooring.

rustic furniture and later spread to the timbers of the home. They are usually worse in hickory, oak, and other hardwood timbers. The grub stage does the damage by boring small tunnels in the wood and by throwing out a fine powder from their tunnels. While ceiling beams, stairs, oak floors, and other oak finish are most likely to be attacked, they may also work in hardwood furniture.

To control them, paint the affected timbers with gasoline, coal oil, carbon bisulphide, orthodichlorobenzene, or carbon tetrachloride. Keep fire away if either of the first four materials is used. Repeat treatment until the infestation is eliminated, as shown by absence of fresh dust. Then the woodwork can be refinished.

INSECTS WHICH ATTACK CLOTHING, RUGS, AND UPHOLSTERED FURNITURE

In recent years clothes moths and beetles have become increasingly difficult to control and their annual toll of valuable furniture, suits, furs, rugs, etc., has become so great that so-called mothproofing and refrigerated storage have been developed to help control these losses.

Clothes Moths.—There are three different species of these small moths: webbing, case-making, and tapestry or gallery-making clothes

moths. Under Missouri conditions, the first two species are most abundant. The moths are very small with slender wings and should not be mistaken for the ordinary moths which come to lights at night. It is the small whitish caterpillar stage that does the feeding and causes the damage. At times, in abandoned garments left in attics, basements or garages, the case-making species in particular may become very abundant.

Control: Under normal conditions with good housekeeping and the frequent attention to garments and other materials which are likely to become attacked, damage from these pests can be largely prevented. Anything containing wool or silk, furs, leather goods, and plumes are likely to be injured. Materials used or handled frequently are seldom damaged, while those stored away for the summer are liable to attack. Plenty of sunlight and ventilation in rooms and closets will help.

Most damage occurs during the summer months. All susceptible materials should be carefully gone over each spring and, after sunning and brushing outdoors, should be packed in tight trunks or chests and fumigated with 1 ounce of carbon bisulphide or 2 ounces of carbon tetrachloride to each 6 cubic feet of space in the chest. Pack the garments, blankets, or furs in the chest, spread over them any clean cloth and on this sprinkle the chemical. Keep fire away if carbon bisulphide is used.

The fumigation should completely rid the treated materials of moths, eggs and larvae, but reinfestation may occur during the summer if a liberal supply of camphor flakes, flaked napthalene or moth balls, or paradichlorobenzene is not kept sprinkled among the clothing in closets, chests, trunks, or moth-proof bags. Cedar chests, cedar-lined closets, and the so-called mothproof bags and closets will help in moth control, but they are not safe without the supplementary use of fumigation and repellants. Also keep in mind that the repellants will not kill eggs or larvae but merely serve to repel the moths and prevent reinfestation.

Commercial mothproofing, although expensive, is quite satisfactory for a limited period of time. Valuable pieces of furniture, rugs, furs, and other winter garments can be placed in cold storage with perfect results during the summer months, if the temperature is kept below 40° F. and preferably around 30° F.

In homes where clothes moths are habitually troublesome, fumigating the entire house with hydrocyanic acid gas may prove desirable, though this is dangerous to use and usually not necessary. Liberal use of household DDT or chlordane sprays in closets, chests and trunks will help.

Carpet Beetles.—In Missouri much of the injury commonly attributed to the clothes moths is really done by the small hairy larvae of either the common black carpet beetles or the so-called "buffalo moth." Larvae do the damage by feeding on wool garments, furs, feathers, and leather goods. The former species will also feed on cereals and museum specimens. However, they are perhaps most notorious as pests of carpets and rugs.

The black carpet beetle larva is reddish-brown in color, slender and tapering to the posterior end where it carries a tuft of long hairs. It is

the more important of the two species on garments, suits, etc. The adult is black and only about one-sixteenth of an inch in length. The adult of the "buffalo moth" is about the same size but more oval in shape and marked with red, white, and black.

These small larvae are rather inconspicuous, moving about slowly and secreting no web or silk tubes as do clothes moths. They are inclined to work in dark places and usually cut holes through the garments, blankets, or other materials on which they feed. Old, discarded furs, woolen garments, and the like left in dark attics or basements are sure to be found by these pests and used as food.

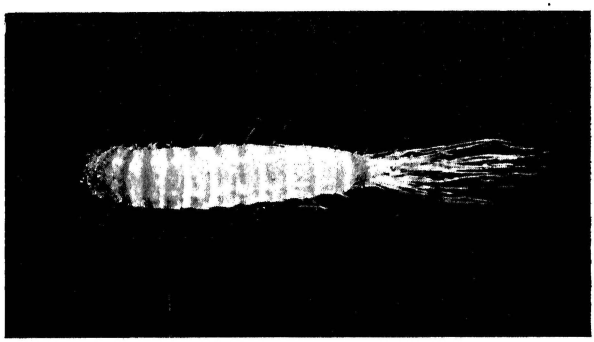

Fig. 4.—Larva of the black carpet beetle enlarged.

Control: To control carpet beetles, much the same measures as used against clothes moths may be used. Light and ventilation, frequent use of a vacuum sweeper or broom on rugs and carpets, sunning and brushing garments susceptible to attack, together with fumigation or liberal use of DDT or chlordane where infestation is severe, and the burning of abandoned materials which serve as breeding sources, will keep these pests under control.

Tow Bug.—Small, white, curled grubs clothed with hair may show up, especially in overstuffed furniture and in a variety of foods and plant materials about the home. These are the larvae of either the so-called tow bug or tobacco beetle or the drug store beetle. These feed on a great many different materials but will seldom attract attention except where they feed and breed on the materials used in overstuffed furniture and, to some extent, on the upholstery. They breed continuously in heated buildings but are most troublesome during the summer months.

Control: Infested furniture may be fumigated in a tight room, using hydrocyanic acid gas, or by carefully using carbon bisulphide or carbon tetrachloride. Frequent treatments of infested pieces of furniture with insect powder, spraying with 5% household DDT, or one of the so-called mothproofing insecticides will also help to control the pest.

PESTS OF FOODS AND STORED PRODUCTS

This group includes the common food pests, such as ants and cockroaches, pests of cereals and dried fruits, meat pests, and those of stored seeds.

Ants.—Several species of ants may come into the home in search of food but the small, red, household ant; the large, black, outdoor ant; and the small Argentine ant, where it has become established, are most troublesome. Ants are especially fond of sweets but will also feed on a number of other foods in the home, at times even entering refrigerators for food. Their fondness for sweets, coupled with their habit of foraging for it and carrying it home for the colony, makes it possible to control them in the home through the use of poisoned syrup.

Control: In case of outdoor ants which come into the home for food, their central nest should be located and the colony killed by fumigating with carbon bisulphide or calcium cyanide. An ounce or two of carbon bisulphide or calcium cyanide poured into a small hole made three or four inches deep in the center of their earthen mound with any sharp stick will usually gas the entire colony. Where the central nest is inaccessible or its location is unknown, the best way to eliminate them is to prepare a sweet bait with a small quantity of arsenic which the ants carry home as food for the colony and which in time poisons them. The following poison syrup has been used for many years with good results in controlling the common house ants: Use one-half pound of granulated sugar and just enough water to make a thick sugar syrup, say two to four ounces. Then dissolve in a little hot water one gram of sodium arsenite and add to the sugar syrup.

To control the Argentine ant, the following poison syrup is widely used: Boil for 30 minutes 1¼ pints of water, 1½ pounds of sugar, 1 gram of crystallized tartaric acid, and 1 gram of benzoate of soda, and then combine it with a second solution containing ⅛ ounce of sodium arsenite dissolved in 1 fluid ounce of hot water and add ⅔ pint of extracted honey. The bait can be put out on bits of cardboard or in empty tin cans where the ants will find it but where it does not come in contact with foods. Also, the bottle or can of poison syrup should be properly labeled and kept out of reach of children. Every few days a new supply of bait should be put out until the ants are all killed. With but a small amount of arsenic in the syrup the worker ants eat it and carry it home to the rest of the colony without detecting the poison in it and, in time, the entire colony is poisoned. DDT applied where they travel over it will help also.

Cockroaches.—In Missouri there are five species of regular household roaches, the American, the Oriental, the German, the brown-banded and the Australian, but from time to time, especially in rainy seasons, other native species show up. The American roach is very large with well developed wings, while the Australian is similar but smaller and with light yellow markings on the thorax and front wings. The female

Oriental roach has only rudimentary wings, and those of the males are reduced. The German roach or "croton bug" is only about half an inch long, light brown with two darker brown lines on the thorax, and it is usually found about sinks or leaky water pipes. The brown-banded species is a new arrival in Missouri, and is about the same size as the German roach.

Roaches develop rather slowly, but they lay many eggs in bean-like packets so that if not kept under control they may soon overrun the house. They can pass through very narrow cracks. They feed at night and are usually in hiding during the day. Starchy foods, pastries and the like are their favorite food. While they are generally clean in habits they have a very disagreeable odor and they can spread infection to exposed foods.

Control: Avoid bringing roaches into the home in cartons or baskets of groceries from stores. Neat and clean housekeeping, especially about the kitchen and pantry will help greatly in keeping down roaches, while crumbs and other foods attract them. Many may be killed with a fly swatter at night. A simple homemade trap is made by placing a few slices of banana, apple or other food in a quart jar, then fitting into the mouth of the jar a paper cone with a hole in the tip. Lay the jar on its side over night.

Some effective roach poisons are on the market. Common sodium fluoride placed where roaches will walk over it has long been considered standard treatment. Roaches continually cleanse their legs and antennae of dust or other foreign matter, so they take the poison into their mouths. Borax mixed with sweet chocolate also makes quite an effective bait. A 10% DDT dust or a 5% household spray or chlordane applied where they crawl over it will also control them.

Pests of Cereals, Flour, and Dried Fruits.—Flour, corn meal, breakfast foods, dried fruits, and similar materials are especially likely to become "buggy" during the warm portion of the year. Insects most troublesome in such foods are the various small grain beetles, rice and granary weevils, meal snout-moth, Indian meal moth, Mediterranean flour moth, and the Angoumois grain moth. They may be brought in with such foods from the grocery store, or they may come from nearby sources of infested grain. Small reddish beetles in the flour bin and small worms in dried fruits and cereals are especially likely to show up each summer. The moths will fly about the house at night and may easily be mistaken for clothes moths.

Control: Avoid carrying over too large quantities of such foods in the home during the summer and frequently check for these pests. Keep such food in sealed containers. Badly infested foods should be promptly disposed of and their containers treated with boiling water or heat to eliminate all stages of the pests. Heating such foods in a slow oven when they begin to show slight infestation or fumigating them with carbon bisulphide will clear up infestation. Simply place the material in any tight chest, box or metal tank, spread over it a clean cloth and

sprinkle onto this one ounce of carbon bisulphide for each six cubic feet of space in the fumigation box. Keep fire away as the fumes are explos ve.

Pests of Cured Meats and Cheese.—The larder beetle, meat and cheese skippers and mites are the most common insect pests of cured meats and cheese in the home. Home cured hams and shoulders in particular must be carefully handled or larder beetles and skippers are likely to attack them.

The larder beetle is closely related to the carpet beetle, about one-fourth inch long, dark brown with a pale band across the front half of wings. Its larva is about one-half inch long, hairy, and feeds on cheese, hides, and cured meat. By using bits of cheese as bait one can destroy the adults before they lay eggs on meat. Hams and shoulders should be promptly and carefully wrapped or bagged as soon as they are cured to prevent the beetles from reaching them. If infestation shows up, cut away badly affected parts, kill all grubs and beetles present, and re-wrap the meat. Store in unheated place for the winter.

Skippers are the active larvae of small, black, shiny flies. Maggots get the name "skipper" from the fact they can jump a considerable distance by flipping. They are apt to get in where the ends of bones are exposed on hams and shoulders, or where the meat shows any evidence of blood. Unless the hams and shoulders are securely wrapped soon after they are cured, the active flies lay eggs on them, and in due time the small white maggots will begin feeding in the flesh.

Where infestation occurs, the affected pieces of meat should be unwrapped every week and all maggots and puparia that can be reached should be removed and burned and the meat securely rewrapped until no further evidence of the pest shows up. Badly affected portions should be cut away and burned and the rest cooked and used.

Several microscopic mites which breed and feed on stored meats and cheese can easily be overlooked. Usually worse on cured meats not keeping well, they may attack well cured meat, too. By carefully going over affected pieces of meat at frequent intervals an infestation can be cleared up. Fumigation with burning sulfur of infested storerooms or pantries will also help get rid of these small pests. Usually meat well cured, properly handled, and not kept too long will escape mite infestation.

Insects Affecting Seeds in the Home.—Dried beans, peas and popcorn are seeds most commonly stored in the home affected by insect pests. Bean weevils, pea weevils and stored grain pests discussed earlier under cereal and dried fruit pests are often serious on stored seeds. The bean and pea weevils visit the green pods in the garden and lay their eggs in the pods. On hatching, the small grubs enter the tiny forming peas or beans in the pods. When ripe beans or peas are stored, the grubs are still inside and later emerge in storage. The bean weevil continues to breed in stored beans, but the pea weevil does not. Affected seeds intended for planting or for food should be fumigated with carbon b sulphide as discussed earlier, using one ounce to each six cubic feet of space in fumigation box and keeping fire away.

PESTS WHICH ATTACK MAN OR SPREAD DISEASE

Man's most dangerous group of insect enemies includes such notorious scourges as mosquitoes, fleas, human lice, the house fly, bedbug, itch mite, chiggers, ticks, and other lesser scourges.

Mosquitoes.—It was not until some forty years ago that the part mosquitoes play in the spread of malarial fever was first discovered and man came to understand the real menace of this pest. The human race had suffered from malaria and yellow fever, especially in tropical climates, for countless ages without even suspecting that certain species of mosquitoes were solely responsible for these important human diseases.

In Missouri all mosquitoes may be broadly classed as those which spread malaria and those which, according to present knowledge, merely annoy man and livestock. Disease carriers at present include only the malarial or Anopheles mosquitoes, though yellow fever mosquitoes have been known to breed this far north.

All mosquitoes require moisture or bodies of water for breeding. Eggs are laid on the surface of water and the larvae or wrigglers on hatching swim about feeding on the microscopic plant and animal life in the water. By means of a breathing tube at the tip of their bodies, they can take air while feeding beneath the surface of the water. When the wriggler is full-fed, it changes to a pupa which moves about freely by tumbling in the water. The adult which emerges from the pupa case rises from the water and spends its life in the air. Only female mosquitoes suck blood.

There are distinct differences between the malarial mosquitoes and the ordinary biting forms. Eggs of the malarial forms are laid singly and float on the surface of the water, while most common mosquitoes lay rafts of eggs which stand on end. Larvae of the malarial forms have short breathing tubes and usually inhabit quiet waters and float parallel to and immediately under the surface of the water. Others have long tubes and hang head downward and may inhabit rough water. Adult malarial mosquitoes sit with their body pointed at an angle to the surface on which they rest, while the common ones sit with body parallel to the surface. Common mosquitoes in seeking a place to bite hum much louder than the malarial ones.

Control: Draining of swamps and other wet places will reduce the number of mosquitoes in the neighborhood. However, mosquitoes sometimes move several miles from breeding to feeding grounds. Cooperative effort is necessary to make a community safe from mosquitoes.

Bodies of water which cannot be drained and where fish do not destroy all wrigglers can be treated by spreading oil on the surface to kill the wrigglers as they come up to get air. A few drops of coal oil in an infested rain barrel will soon kill all wrigglers, pupae, and eggs. Common fly sprays, the new aerosol space sprays, and DDT residual sprays applied to shrubs, screens and walls of rooms, are effective in killing the pests. Screens will help to keep mosquitoes out of the house. Proper

clothing will also give protection when one must work in mosquito-infested areas. A person who develops malaria should consult a physician.

Fleas.—On Missouri farms where hogs are raised or where there are dogs, fleas are most likely to become a problem. While sucking blood from its host, the female flea deposits eggs which sift down into the bedding or litter where later they hatch into worm-like larvae. These feed on animal off-falls in the bedding of dogs and hogs and later transform through the resting stage to the adult, active, blood-sucking flea. It requires about one month to pass from the egg to the adult stage, so several generations may develop in one year.

Barns, sheds, and hog houses, outbuildings, or basements, may become overrun with fleas. Later they spread to barn lots, yards, and other buildings including the home. The flea bite is painful and very irritating to most people, especially children.

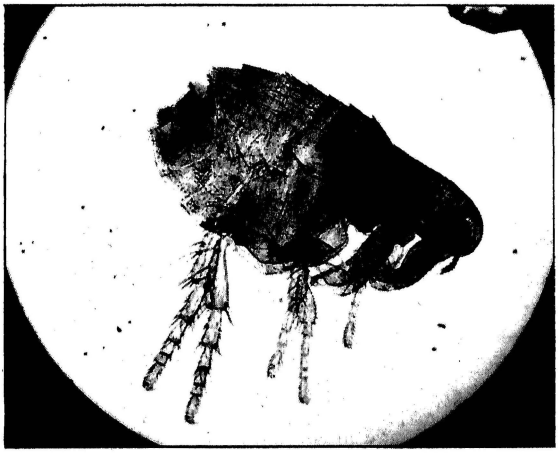

Fig. 5.—Common dog flea enlarged. This is one of the most annoying pests of man, especially when brought into the home.

Control: To prevent or to clean up an infestation of fleas, first go to the source of trouble and stop further breeding. Clean out bedding material and burn or scatter in fields as manure. Then thoroughly spray the ground, floor, and walls of breeding places with DDT, coal oil, or other strong killing solution. Repeat the spraying of the ground and walls in infested buildings each week until the pests are under control.

If hogs are the source of trouble, plan to shut them out of the infested buildings during the treatment. Treat dogs once or twice a week with a good insect powder or bathe them in one quart of coal oil to three gallons of soapsuds.

Where fleas have been carried into the home, liberal use of one of the fly sprays, including pyrethrum, rotenone, DDT or chlordane, in closed rooms, or about 5 pounds of flaked naphthalene scattered about on the floor of a closed room and left for two days will usually rid the

room of fleas. Special care should be taken to keep them out of bedrooms and bedding.

Prompt action in stopping further breeding in the bedding places of animals, combined with the treating of infested hosts and the destruction of the old fleas wherever they may be will in time clean up an infestation. The rat flea, a close relative of the dog flea, is the carrier of the dreaded Bubonic plague.

Bedbugs.—A pest of man down through the ages, the bedbug has adjusted its habits to his ways. It attacks man while he sleeps and hides in dark retreats during the day. It is able to go without food for long periods of time but develops quite rapidly when food is available. Investigators have had newly hatched nymphs live for weeks without a first meal.

Control: One or two thorough applications of standard 5% household DDT in odorless kerosene to mattress, bed, floor, and adjoining walls will completely rid the home of this pest.

Human Lice.—Where sanitation and hygiene are neglected as in thickly populated regions or where large groups of individuals from all walks of life are suddenly brought together, as in army camps, public

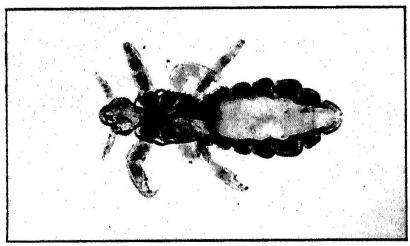

Fig. 6.—Fullgrown head louse enlarged. This pest is most troublesome on children in thickly settled sections.

schools, and even athletic teams, a louse problem may develop. Prompt steps should be taken to eliminate it, as the body louse in particular is a real menace to health as a carrier of human diseases. Even under the best of conditions, the head louse occasionally shows up in our public schools and then becomes a real household problem.

Three different kinds of human lice are the so-called head louse, the body louse or "cootie," and the crab louse. The first two, however, are varieties of the same species. The head louse is most common among children while the latter two most often cause trouble where large numbers of people assemble.

They are all blood-suckers and cause severe pain and irritation by feeding. The body louse is now known to be the principal carrier of typhus fever and other related diseases.

Control: Sanitation and personal hygiene are absolutely necessary in avoiding or in controlling attacks of these pests. A head louse

infestation may be cleaned up by using a fine toothed comb moistened with coal oil, by using sulfur ointments, by cutting the hair and applying coal oil twice a few days apart. The coal oil should be washed out with hot soapsuds in a few minutes to prevent possible skin irritation. Frequent and thorough washing of the head in a hot bath, with plenty of soap and enough lye or water softener to break it, will usually eliminate the head louse. A dilute solution of vinegar will help to remove the "nits" from the hair. Burning or sterilization of hats or caps worn by individuals is also necessary.

To eliminate the body louse, sterilize clothing and bed clothing used by infested individuals with steam or by soaking in gasoline. Two treatments about a week apart will eliminate both eggs and the lice. The patient should take frequent hot baths, change clothing, and treat the clothing. Liberal applications of 10% DDT powder to the body, infested clothing, bedding, and rooms and repeated in two weeks will clean up infestations of either of the three human lice. This was standard treatment in the army.

The crab louse can be controlled by the same treatments suggested for head and body lice or by the persistent use of mercury ointments. Clothing should also be treated to make sure reinfestation from that source does not occur.

Itch Mites.—The real itch disease is the work of a very small mite, not a true insect but a close relative of ticks and spiders. The female mite bores into the skin, especially where it is thin, and later lays eggs in this tunnel. These eggs hatch, and the young mites escape and make tunnels of their own. This boring about in the skin causes very severe itching and, in time, serious skin eruptions. It requires from about 4 to 8 days for eggs to hatch and about two weeks before the young are sufficiently developed to start their own tunnels.

Control: Diagnosis by a competent physician is important, together with his prescription of an ointment. Ordinarily the patient is given a vigorous rubbing all over with green soap and hot water to soften the skin and remove scurvy epidermis. This is followed by a prolonged hot bath after which one of the sulfur ointments is applied all over the body. This treatment is given just before going to bed and the next morning it is removed by taking a hot soapy bath. The sulfur ointment kills living stages of the mites but not the eggs deep in the tunnels, so a second treatment in about three days should be given. The clothing, especially the underclothing and night clothes and bed sheets, should be changed each day and laundered, using boiling water. Follow your physician's instructions on control of itch.

Chiggers.—The chigger is not an insect but a mite something similar to the itch mite. It thrives best in shady places where soil is rich in humus. The real chigger is the newly hatched larval stage of small spider-like mites and in this first 3-legged stage it apparently requires the blood or serum of man or other living host. In its later 4-legged stage, it feeds on decomposed organic matter. Chiggers are more trouble-

some in the more southern states but are fairly common even in the more northern counties of Missouri. They begin to attack man at the approach of warm, summer weather, usually reach a height of abundance in June and July and are usually no longer troublesome by the latter part of August. Gardens, briar patches, woods and, at times, even lawns, pastures and meadows may be overrun by them.

It is the young stage of the mite which attacks man, poultry, and other farm animals. It is so small that many people cannot see it without magnification. It is about the size of the point of a pin, bright red

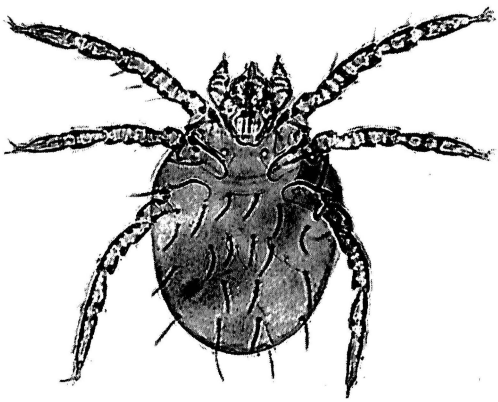

Fig. 7.—Common chigger, enlarged 124 times.

in color so that on a white surface it shows up quite well. Its bite causes a red bump with usually a white center. The irritation causes one to scratch and thus remove or destroy the mite. It is usually secondary infection due to scratching that causes most serious results.

Control: Lawns, paths and other chigger infested areas may be treated with sulfur, DDT, benzene hexachloride, chlordane or similar insecticide. High boots and tight-fitting clothing make it difficult for the mites to reach the skin and attach themselves. Sulfur dusted in shoes and socks or on the trouser legs will help. Change clothes promptly after exposure, sun the clothes, and take a soapy bath. The army and navy developed very effective chigger ointments which are now available.

Some common household materials which may be applied to kill the chiggers and partly relieve the irritation are ammonia, camphor, rubbing alcohol, iodine, weak carbolic acid solution, carbonated vaseline, mentholatum, sulfur ointments, zinc ointment. They will kill the mite and help check irritation and possibly secondary infection.

Ticks.—Common ticks are close relatives of spiders and are not true insects. They may be brought into the home on dogs or one's clothing. They have especially adapted mouth-parts or jaws for attaching themselves to the host while sucking blood.

Certain species of ticks, notably the Rocky Mountain spotted fever tick and the Texas fever tick of cattle, spread diseases of man and livestock. In Missouri there are several species of ticks though only the adult stage of the common dog tick and all stages of the lone star tick bite man ordinarily.

Fig. 8.—Adult ticks enlarged.

The female tick after maturing, mating, and becoming fullfed on the host drops to the ground where she deposits a mass of eggs, often several thousand. These hatch into tiny young or so-called seed-ticks. In time some of these succeed in attaching themselves to passing animals or man, in case of the lone star tick, on which they may feed and later drop to the ground. These engorged 6-legged seed ticks shed their skin and change to the 8-legged nymph stage. They again attack passing hosts, engorge, and once more drop to the ground to shed the skin and change to the adult stage. These in turn again attack passing hosts, engorge, and once more drop to the ground to later deposit eggs. All of our more common Missouri ticks work this way and are known as three-host ticks.

During spring, summer, and fall one must be careful to avoid being attacked by ticks. Pet dogs often bring them into the house, particularly the newer brown dog tick which does not bite man but which often becomes an annoying household nuisance.

Control: As in case of the chigger, wear high boots and tight-fitting clothing while working in infested areas. Use sulfur or one of the new commercial chigger repellents in clothing to repel them. Make sure they are not breeding on pets in the home. Treatments used to clear lawns of chiggers will also get rid of ticks. Household sprays containing rotenone, chlordane, or DDT may be used to rid homes of the brown dog tick. Any person who is bitten should carefully remove the tick, being sure that the head is not left in the wound. Induce bleeding, and then disinfect the wound. Very severe sores and serious infection may result when the tick is carelessly removed leaving behind its mouth parts.

Assassin Bug.—During summer and fall months in Missouri, a very active black bug and a related red and black marked one commonly called

the "kissing bugs," may cause much annoyance. They come to lights and have wasp-like action. Its bite is even more painful than a wasp's sting. True bugs with piercing and sucking mouth organs, they normally live under rocks and about logs and stumps. They prey on other insects, sucking their blood as food. They may attack any exposed portions of a person, especially the hands and face, thus the name "kissing bug." The bite may cause severe pain and swelling and is often mistaken for flea or bedbug bites. Destroy them when they come to light and prevent from hiding in bed clothes.

House Fly.—This is one of man's most dangerous enemies. A filth inhabiting and disease spreading insect pest, it is known as the "typhoid fly" though it is more often responsible for the spread of other less fatal

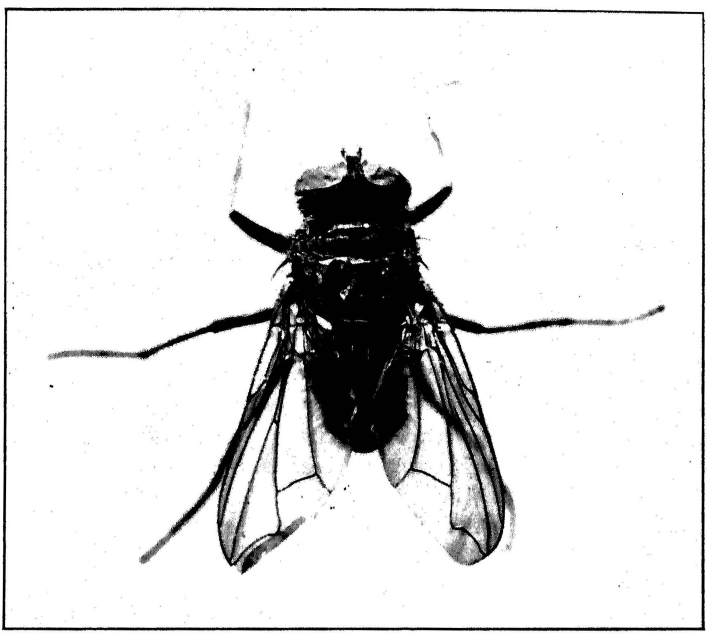

Fig. 9.—The house fly enlarged. This is a most dangerous household pest as it is able to carry and spread the germs of various diseases.

diseases of the digestive tract. It is always closely associated with man's food, on which it may smear germs of various diseases. It breeds most commonly in fresh horse manure in stables, but any decaying vegetation may serve as food for its maggots. It breeds abundantly and each succeeding generation may mature rapidly during the summer months. In Missouri the house fly lives through the winter largely in the resting stage or as purparia in manure piles or in stables though some adult may survive in basements and other sheltered places. Adults are among the early spring insect arrivals and breeding soon begins. Their habit of feeding on filth, carrion, or other infected materials one minute and next

visiting exposed foods in the market or home makes them so important as germ carriers.

Control: To control this pest and prevent it from spreading disease, it is necessary first that the number of flies be reduced to a minimum; second, that all carrion, sewage, and other sources of infection be eliminated; and third, that foods be kept out of reach of flies. Dairymen, grocers, bakers, and meat market managers in particular should take precautions against this pest. Scarcity of horses and cattle in towns and cities has helped to reduce the number of flies in such places. Around dairy barns and on farms where stable manure is not properly handled or promptly scattered in the fields, the fly has its best chance to multiply.

Efforts should be made to reduce fly breeding by disposing of manure every few days or else store it in fly-proof manure pits. Where flies show up, dispose of them with fly sprays, traps, poison baits, sticky paper, swatters. See that the home and other buildings housing foods are properly screened. Keep all foods in the home or in stores protected from flies.

Systematic use of DDT sprays on livestock to control the small blood sucking flies and applied to walls, ceilings, stanchions, manure piles, and nearby fences is practically eliminating the house fly on farms. Careful use of DDT sprays to screens, walls, and ceilings where house flies are troublesome in homes, restaurants, hotels, food stores and other fly-infested places will help to prevent outbreaks of typhoid or other human diseases.

MISCELLANEOUS HOUSEHOLD PESTS

Other insects or related animals which may cause trouble in the home include silverfish, crickets, wasps, spiders, centipedes, sow bugs and others.

Silverfish or Fish Moths.—These little slender flashes of silver with three long bristles at the tips of their bodies are often found in attics or

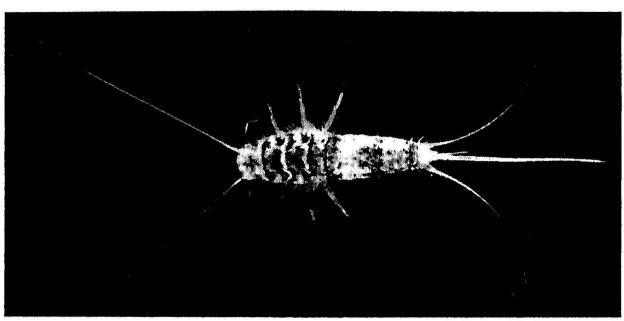

Fig. 10.—One of the common silverfish or fish moths enlarged.

basements where papers and magazines are stored. At times they show up in closets and dresser drawers where they feed on the starch in clothing. Starch in paper and bookbinding, and more particularly rayon, seems to be their choice food.

Avoid leaving rayon goods, paper, books, or other materials containing starch where silverfish have undisturbed access to them. To destroy an infestation, dispose of such materials. Prepare a small quantity of starch paste and add a little arsenate of lead or white arsenic to the paste and put it out on bits of cardboard. In closets, trunks, or dresser drawers one of the repellents, such as camphor flakes, naphthalene, or paradichlorobenzene may be used and over books and magazines pyrethrum dust or household DDT may be applied. Rayon curtains, walls, and other parts of the home where the pest appears may be sprayed with DDT occasionally.

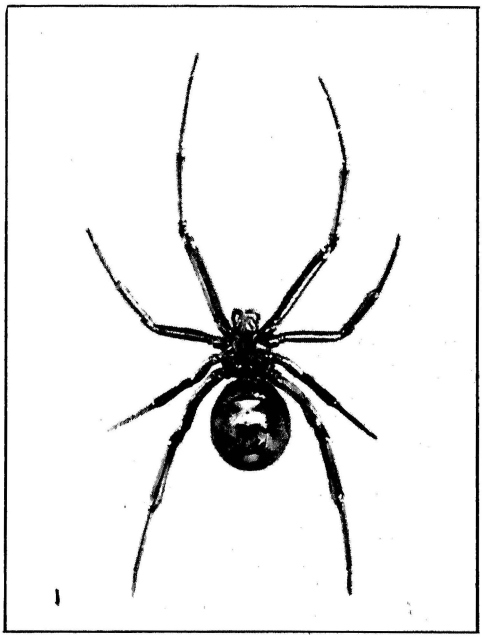

Fig. 11.—Dangerous black widow spider, showing the telltale hourglass mark on the underside of the body.

Spiders.—The common cobweb spiders annoy the homemaker by continuing to make unsightly cobwebs. Certain species of the jumping spiders, which spin but little web, habitually live in homes where they catch and eat flies and other household pests. At times, much larger outdoor species invade the home in search of winter harbors.

Specimens of the much-feared and really dangerous hour-glass or black widow spider have been taken in Missouri homes in the last few years. This is the only species of spider in Missouri which is really dangerous. It is a safe practice to avoid handling any species, and by all means do not handle the poisonous hour-glass spider. It is a black spider with long legs. The female, when mature, may have a body the size of a concord grape, with a bright red hour-glass spot on the under-

side of her body. The males and immature females may also have red spots along the mid-line of the back. Hand destruction with a fly swatter or broom and removal of webs will take care of spiders satisfactorily. Household DDT and chlordane sprays will also help to rid homes of spiders.

Centipedes.—The common long-legged house centipede often seen strolling leisurely over the ceiling or walls of the home is much feared, though perfectly harmless. It is really a beneficial creature, feeding on flies, moths, and other insects in the home. At times, outdoor species of rapidly crawling centipedes and small or large brown or black, slow-moving millipeds may invade the home. These can be swept out. The millipeds do not bite but the larger ground-inhabiting centipedes have fangs and may inflict a severe wound if handled. Household DDT sprays may be used.

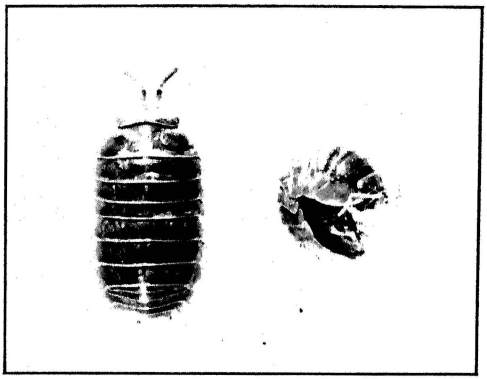

Fig. 12.—The common sow bug which often appears in the home, especially in moist basements.

Sow-bugs.—These small gray creatures, which roll up when disturbed, are not true insects but relatives of the crayfish. They inhabit and feed in moist places such as basements, under boards, and the like, but at times they move up into the home. They feed on mushrooms, stored vegetables, fruits, and similar materials but do not attack clothing or rugs. In basements and greenhouses slices of carrot, potato, sweet potato, or apple dusted with arsenate of lead serve very well as a poison bait. Hand destruction of them or sweeping them out will take care of them.

Crickets.—The common black crickets and, at times, the so-called cave crickets may appear in homes, especially in basements. These insects normally feed on vegetation and plant materials, such as mushrooms, tubers, fruit, etc., but some claim that they also cut clothing presumably for the starch. At times, they may come into the home in great numbers, especially in the fall preparatory for winter hibernation. Eliminate them by killing all on sight and by putting out poison bait for them. Slices of vegetable, such as carrots or potatoes, dusted over with

arsenate of lead and placed where the crickets will find them, but out of reach of children, serve very well as poison bait. Household sprays may also help.

Wasps and Bees.—The common mud daubers and paper wasps may make their nests in homes, especially in attics, and individuals may be stung by them. In the fall the females of our common paper wasps often collect in great numbers in the home seeking a favorable place to hibernate. However, they can be destroyed and prevented from nesting about in the home.

Colonies of honeybees, at times establish themselves in attics, chimneys, porch posts, and walls of houses. They may cause much annoyance and often grief by stinging individuals. An experienced beekeeper can usually be secured to remove them or to kill them by dusting the enclosure with chlordane or DDT.