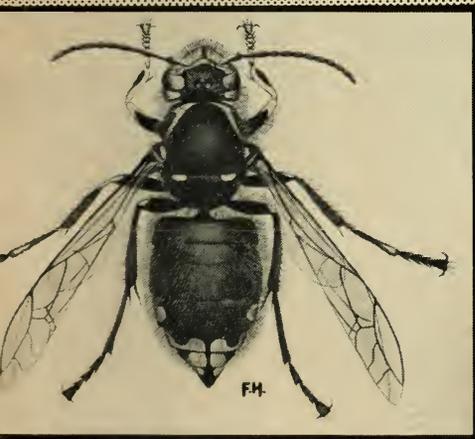
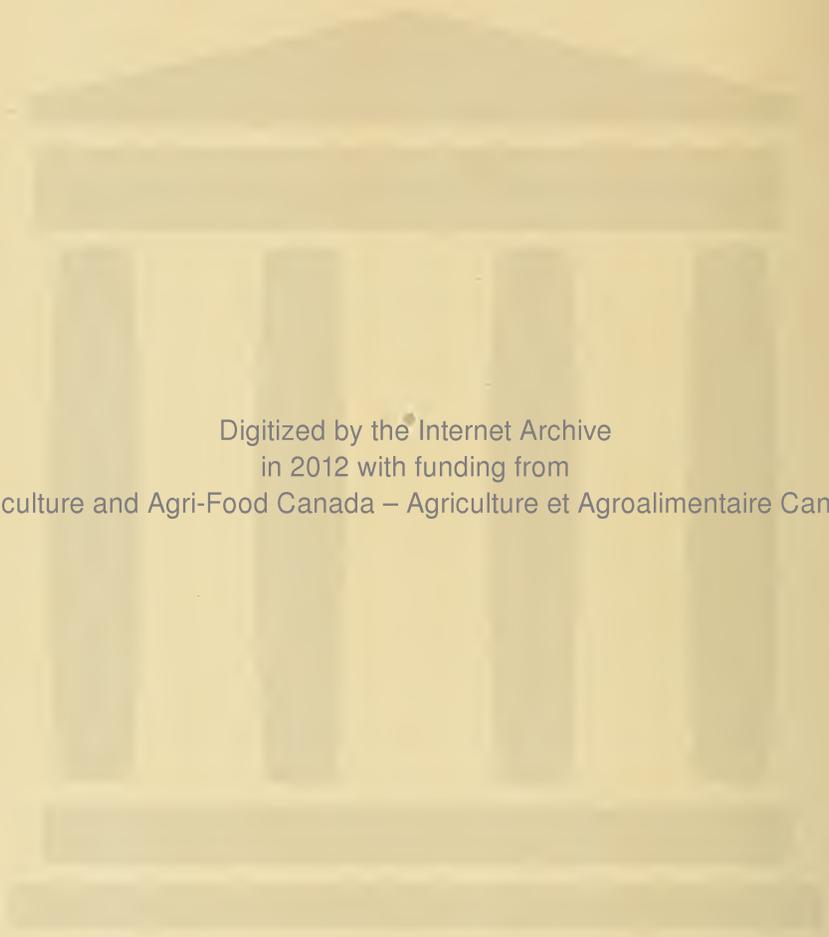


*Control of*  
**Bedbugs,  
Fleas, Lice,  
and Wasps**



BY C. R. TWINN • ENTOMOLOGY DIVISION

CANADA DEPARTMENT OF AGRICULTURE  
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# CONTROL OF BEDBUGS, FLEAS, LICE, AND WASPS<sup>1</sup>

by

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## BEDBUGS

The bedbug<sup>2</sup> is an oval, flattened, reddish-brown, wingless insect about a quarter of an inch long when full grown (Figure 1). It is world-wide in distribution and may occur in dwellings of any kind.

Both sexes of the bedbug are bloodsuckers and prefer human blood. They also feed readily on a number of animals and birds, including mice, rats, guinea pigs, rabbits, fowl, and canaries. Their bites affect man in varying degree, causing little or no discomfort in some but swellings and inflammation in others.

Bedbugs are normally active at night and hide in the daytime in cracks and crevices in walls, woodwork, and furniture, behind pictures, under loose wallpaper, and in mattresses and frames of beds. When very hungry they may feed in subdued light during the day, such as in darkened rooms and in theatres and other public places where furnishings have become infested.



Figure 1.—The bedbug, enlarged and natural size.

Bedbugs may travel short distances in search of blood, and consequently an infested room, apartment, or flat is a continual menace to others nearby. They may also be carried on clothing, in baggage, and in furniture; and are sometimes introduced into the home by domestic help or by visitors.

<sup>1</sup> Replacing Processed Publication Series, Entomology Division, No. 33.

<sup>2</sup> *Cimex lectularius* L.

## Life-History

Bedbugs lay small, white, elongate eggs in cracks and crevices in walls and woodwork, behind moldings and loose wallpaper, and in other places, such as on blankets, mattresses, and the springs and framework of beds. The eggs are fastened to the objects on which they are laid by a sticky material that dries on exposure to air. Each female lays about 200 eggs, depositing several daily under favorable conditions. The eggs hatch in a week or two at comfortable room temperatures, but take longer when it is cooler. The newly hatched bugs look like the mature ones, but are smaller and paler in color until after feeding. They molt, or shed their skins, five times before reaching maturity and require at least one meal of blood between molts. Development from egg to egg-laying adult takes from one to several months, depending on the temperature and the availability of food. If the female feeds normally, she may live about 2 to 11 months, with an average of about 6 to 8 months. Adults and the larger nymphs may survive without food for several months to a year or longer under moist, cool conditions.

## Similar Related Bugs

There are several species of bugs closely related to the bedbug and similar in appearance. Two of them, the bat bug<sup>3</sup> and the swallow bug<sup>4</sup>, may occur in dwellings in Canada. They are so similar in appearance to the bedbug that they can be distinguished with certainty only by a specialist. The bat bug, an external parasite of bats, sometimes causes alarm and annoyance by invading the living quarters of dwellings in which bats roost. It is not an important pest of man. The swallow bug is normally a pest of swallows, but has been reported attacking man. It inhabits the nests of swallows and, when numerous or when the birds leave their nests, may invade dwellings or other buildings on which the nests are located.

## Control

*Insecticides.*—DDT is very effective in destroying bedbugs. A surface, or residual, spray containing 5 per cent DDT in refined, deodorized kerosene leaves a deposit of DDT crystals that may continue to kill the bugs for months after the spray is applied. For this reason it is not essential to hit all the bugs during the spraying, as when using a spray without DDT or other residual insecticide.

Apply the DDT spray as a coarse mist with a portable compressed-air sprayer. For treating one or two rooms, a hand sprayer of the continuous-spray type, may be used. Apply the insecticide to all parts of the framework of beds and the woodwork of bunks, paying special attention to cracks and other hiding places; also spray the bed springs. Spray mattresses lightly all over, particularly the tufts and folds, preferably allowing several hours for them to dry before they are slept on. Spray the baseboards of the room, and cracks and crevices in the walls in which the bugs may hide or deposit eggs. Spray the furniture also, particularly any that is upholstered. One thorough treatment liberally applied should eliminate an infestation of bedbugs and prevent reinfestation for at least several months.

When spraying keep windows and doors open to reduce fire hazard. Avoid contact with the spray and, after spraying, wash exposed parts of the skin with soap and water.

<sup>3</sup> *Cimex pilosellus* (Horv.).

<sup>4</sup> *Oeciacus vicarius* Horv.

A 5 per cent DDT emulsion is also satisfactory. The insecticide for this is usually sold as a 25 per cent emulsifiable concentrate. Prepare it for use as a 5 per cent emulsion by adding one part of the concentrate to four parts of water and mixing thoroughly. Another form, which may be used where there is no objection to a visible deposit, as in camps, poultry houses, and other animal quarters, is 50 per cent wettable DDT powder. This is mixed with water to form a suspension. Mix 1 pound with 2 gallons of water for a 2½ per cent spray, which is adequate with this form of the insecticide.

Other residual insecticides that may be used are lindane, 0.5 per cent, and chlordane, 2 per cent, applied as an oil-base spray or as a water emulsion or suspension.

*Other Measures.*—Remove old, torn, and loose wallpaper, fill cracks in the wall plaster, and re-paper the walls after thoroughly washing them down. Fill cracks in woodwork with putty or a proprietary crack filler and apply a coat of paint or varnish. Thoroughly clean the premises and get rid of superfluous or useless articles that may serve to harbor the bugs. Persistent care and cleanliness in housekeeping is a valuable aid in preventing or eliminating bedbug infestations.

To prevent the accidental introduction of these insects into the home, use caution in buying or using second-hand furniture and bedding, or timbers and other materials from buildings that have been demolished and may have been infested. Also bear in mind that furniture and other goods stored in infested warehouses may become infested, and that domestic help or visitors living in infested homes may unwittingly carry the insects in their personal effects or clothing.

## FLEAS

Fleas are common external parasites of mammals and birds. They are small, hard-bodied, brownish, active insects. They are wingless but have powerful legs and are good jumpers. They have flattened sides and backward-pointing spines and bristles, so that they are admirably suited for moving

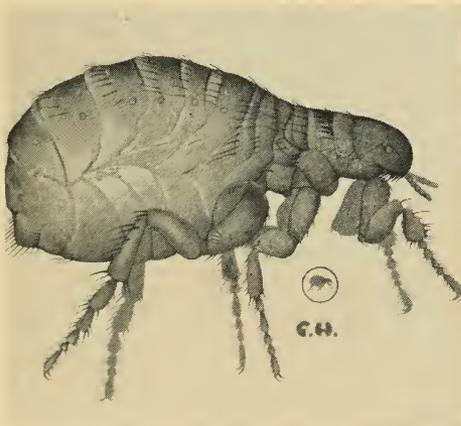


Figure 2.—The dog flea, enlarged and natural size.

rapidly among the hairs of their hosts. Their mouth parts form a lance-like piercing organ with which they suck blood. Both sexes feed on blood. Warm, moist conditions favor their development, and certain species often become troublesome in dwellings in summer and autumn.

The cat flea<sup>5</sup> and the dog flea<sup>6</sup> (Figure 2) are the two species of fleas that are the most troublesome as household pests in Canada. These insects, each of which normally infests both cats and dogs, readily attack humans when hungry. They are most frequently complained of in late summer. People returning from vacations to houses that have been unoccupied for several weeks are often attacked.

Other species that are known to attack humans in Canada are the human flea<sup>7</sup>, the European chicken flea<sup>8</sup>, the western chicken flea<sup>9</sup>, and the oriental rat flea<sup>10</sup>. The human flea has many hosts besides man, and is widely distributed; the European chicken flea is a parasite of fowl and wild birds and occurs from Alberta eastward; the western chicken flea is found on domestic and wild birds in Alberta and British Columbia; and the oriental rat flea has been recorded on rats in the coastal region of southern British Columbia.

Fleas are obnoxious not only because their bites cause discomfort but also because they may transmit undesirable organisms and diseases to humans. The oriental rat flea is the principal vector of bubonic plague; but the cat, dog, and human fleas are also among the potential carriers of this disease. The cat and the dog flea also serve as the intermediate hosts of the dog tapeworm, which is occasionally parasitic in man.

### Life-History

The life-history of the cat and dog fleas is fairly typical. The fleas lay small, white, oval eggs loosely among the hairs of cats and dogs or in their sleeping places. The eggs drop or are shaken from the animals, and hatch into tiny, cylindrical, legless maggots, or larvae, that feed on various animal and plant substances in floor cracks, under carpets, and in other sheltered places. On reaching maturity, the larvae spin small silken cocoons and change into the pupal or resting stage, emerging later as adult fleas. The life-cycle may take from several weeks to many months, depending on environmental conditions.

### Control

*Sanitation.*—Thorough housecleaning helps to prevent outbreaks of fleas in dwellings. This should include periodic cleaning of the basement and, if possible, frequent use of a vacuum cleaner on floors, carpets, and rugs. Give special attention to the sleeping quarters of pets.

*Insecticides.*—After a thorough housecleaning, spray the floors of infested rooms (including the basement), and rugs, mats, and other infested places, such as upholstered furniture and the sleeping quarters of pets, with 5 per cent DDT in refined kerosene. Apply the spray as a wet mist with a portable pressure sprayer or other suitable spraying equipment. This treatment is effective against the immature life-stages as well as the adult fleas. Sprays containing 2 per cent of chlordane or 0.5 per cent of lindane are also effective. After spraying, wash with soap and water to remove any insecticide that may have come in contact with the skin. Do not apply oil sprays to animals.

For outdoor infestations, such as in sand piles and lawns, spray with a suspension of 1 or 2 per cent DDT prepared by mixing 50 per cent wettable DDT powder in water. This may also be used to treat yards, chicken houses, and other animal buildings that have become infested.

Rid dogs of fleas by rubbing through the hair a powder containing 10 per cent DDT, or 1 per cent lindane. The addition of pyrethrum to these powders

<sup>5</sup> *Ctenocephalides felis* (Bouché).

<sup>6</sup> *C. canis* (Curt.)

<sup>7</sup> *Pulex irritans* L.

<sup>8</sup> *Ceratophyllus gallinae* (Schr.).

<sup>9</sup> *C. niger* Fox.

<sup>10</sup> *Xenopsylla cheopis* (Roths.).

inactivates the fleas more quickly; about 10 per cent is enough. About half an ounce of powder is sufficient to treat a medium-sized dog. This treatment is also effective against lice on dogs. Do not use DDT or lindane on cats because they lick themselves freely and are more susceptible to the insecticide. Instead, treat them in a similar manner with pyrethrum powder.

### LICE

There are two kinds of lice; the biting lice, commonly called bird lice because many of the species live on birds, and the sucking lice, which spend their entire life-cycle as blood-sucking parasites on mammals. Two species of sucking lice occur on man; the human louse<sup>11</sup>, which has two forms, the body louse and the head louse; and the crab louse<sup>12</sup>.

Although many people brought up under modern conditions of hygiene and sanitation may never have seen a louse, these insects are among man's most ancient and intimate companions and are still common wherever there is overcrowding, lack of bathing facilities, or carelessness in personal hygiene.



Figure 3.—The head louse, enlarged and natural size.

The bites of lice are irritating and may cause severe scratching and resultant inflammation. The body louse is the most important species because it carries typhus fever, trench fever, and relapsing fever. The first two diseases are especially common in wartime and have caused many casualties among soldiers as well as civilians.

The head louse (Figure 3) and the body louse are small, wingless insects, elongate-oval in shape, one-eighth of an inch or less in length, and varying in color from whitish to brown. The two forms are almost indistinguishable

<sup>11</sup> *Pediculus humanus* L.

<sup>12</sup> *Phthirus pubis* (L.).

in appearance, but the head louse is usually smaller, darker, and more active than the body louse. The head louse attaches its tiny oval eggs, or nits, to the hairs of the head; the body louse attaches them to the clothing and hairs of the body. A female louse may lay as many as 300 eggs in her lifetime; these hatch in about a week to 10 days, and the entire period from egg to egg may take about three weeks under favorable conditions.

The crab louse is smaller than either the head or the body louse and in general appearance resembles a tiny crab; it is about one-fifteenth of an inch long. Its legs are large in comparison with its body, particularly the two hind pairs, which have strong claws well adapted for clinging to hairs. This species is not known to carry disease, but sets up irritation and fever by its feeding activities. It lives on hairy portions of the body, particularly about the pubic region and armpits, where it attaches its eggs to the bases of the hairs. It lies close to the skin of its host and may remain feeding in one place for several days. During her lifetime the female may lay 50 or more eggs. The period from egg to egg is about four to six weeks. The presence of these insects may be detected by the irritation set up and by the appearance of small, irregular bluish spots on infested parts of the body.

### Control

The control of lice is relatively simple with DDT or other chlorinated hydrocarbons. A powder containing 10 per cent of DDT in pyrophyllite or talc has been widely and effectively used for this purpose. Resistance to the chemical was reported in lice in Korea. If DDT should not be effective, use a powder containing 1 per cent of lindane. Pyrethrum and a pyrethrum synergist, such as piperonyl butoxide, may be added to the DDT or lindane powder to inactivate the lice more quickly.

*Head Lice.*—Apply 10 per cent DDT powder lightly to the hair and rub it in thoroughly with the fingers. Do not wash the hair for at least 24 hours. DDT does not destroy the eggs. Therefore, repeat the treatment in about 10 days to destroy any young that hatch after the first application. In addition to treating the head, dust the powder on the inside of head coverings worn by infested persons.

*Body Lice.*—Apply 10 per cent DDT powder to the inner surface of shirt and underclothing, and dust it on the inside seams of outer garments and on the hairy parts of the body. Use at least one ounce of powder on the clothing and person of each individual. Apply a second treatment about 10 days after the first.

When it is necessary to treat large numbers of persons, e.g., troops, prisoners of war, or civilian populations threatened with louse-borne disease, use mechanical dusting equipment such as plunger-type hand dusters or a power duster equipped with a number of separate leads, to which are attached dusters that can be used simultaneously. Insert the tube of the duster into openings of the clothing: at the neck, at the waist, and at the cuffs of sleeves and trousers, and force in the powder to give thorough coverage of the inside of the clothing. Dust the hair of the head and the inside of the hat or cap also. Instruct each person not to bathe for at least 24 hours or change underclothing for several days.

*Crab Lice.*—Apply 10 per cent DDT powder to the hairy parts of the body, paying particular attention to the pubic region, the area between the buttocks, and the armpits. Do not bathe for at least 24 hours, and repeat the treatment in about 10 days.

*Lice on Dogs.*—A species of sucking louse<sup>13</sup> is sometimes found on long-haired dogs. Use 10 per cent DDT or 1 per cent lindane powder, rubbing it through the hair to the skin. Repeat the treatment in about 10 days to destroy any young that may hatch after the first application.



Figure 4.—The yellow-jacket wasp.

### WASPS

Wasps often occur in and about dwellings and may become a nuisance because of their habit of stinging when annoyed. There are many species of social wasps, particularly of the genus *Vespula*, known popularly as yellow jackets (Figure 4) and hornets. The bald-faced hornet<sup>14</sup> is shown on the cover. These insects build their nests (Figure 5) of paper about dwellings on verandas, eaves, ceilings, or rafters, or in trees or shrubs, or underground. Mud-dauber or digger wasps also commonly occur about buildings and may construct their clay nests both indoors and outdoors. They are slender, elongated wasps. Some species are black and yellow, or steel blue; others are

<sup>13</sup> *Linognathus setosus* (Olf.).

<sup>14</sup> *Vespula maculata* (L.).

shiny black. Wasps of the genus *Polistes* are also slender, and black, brown, or red in color, with a few yellow markings. They construct open paper nests in and about homes consisting of a circular comb of cells in a single layer opening downward.



Figure 5.—Nest of yellow-jacket wasp.

Wasps are usually considered beneficial insects in that they feed on flies and other noxious insects and rarely attack humans without provocation. Only workers and queens have stings, which are formed from the ovipositor, or egg-laying tube. Normally the sting is used for killing or paralyzing the prey on which the wasps and their larvae feed. Wasps are also fond of sweet substances and are attracted to the juices of fruits, preserves, and other sweet materials.

### Control

When wasps are annoyingly abundant, find the nests and destroy the inmates by applying an insecticidal spray or dust with a hand sprayer, a portable pressure sprayer, or a dust gun. Do this after dusk, when the wasps are less active and most of them are in their nests. For spraying use 0.5 per cent lindane, 2 per cent chlordane, or 5 per cent DDT in oil solution; for dusting use 5 per cent chlordane, 1 per cent lindane, or 10 per cent DDT powder.

An oil spray is preferred for treating open nests and the clay nests of mud-dauber wasps. Soak the nests with the insecticide. Treat enclosed paper nests or nests in the ground by inserting the nozzle of the sprayer or the tube of the dust gun into the opening of the nest and forcing the insecticide into the interior.

For further information write to the Veterinary and Medical Entomology Unit, Entomology Division, Science Service Building, Ottawa.



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