

Connecticut Agricultural Experiment Station  
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## FLEAS AND THEIR CONTROL

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Fleas are familiar insects to anyone owning pet animals. They are small, brown, wingless insects with piercing and sucking mouth parts. The body is much flattened at the sides and is provided with stiff bristles slanting towards the rear, which probably prevent back slipping and aid the thin bodied insect to pass rapidly among the hairs of its host.



FIGURE 11. Dog flea, male. Enlarged about 24 times.

Cats and dogs are nearly always infested with fleas. In Connecticut the most common species on both animals is the dog flea, *Ctenocephalus canis* Curtis. The cat flea, *Ctenocephalus felis* Bouché, has been reported from Connecticut, but the species is much more prevalent in the south where it is as abundant on dogs as it is on cats. Both species readily attack human beings, and are frequently found on rats, skunks and other warm blooded mammals. These two insects appear so much alike

that some authorities consider that the cat flea is only a variety of the dog flea. Whether one or the other is present is of minor importance to the animal or its owner, as the habits of the two fleas are very similar and the method of control is the same. Although only the adult form is found on animals, fleas pass through four stages in their development, the egg, larva, pupa and adult. The life cycle of the dog flea from egg to adult, in warm weather and with other favorable conditions, may be completed in from two weeks to twenty days, but in cool weather it may require more than four weeks. The adults are comparatively long lived, especially in cool, moist climates. Dog fleas when fed have been kept alive for 234 days and without food for 58 days. The adult dog flea is shown in FIG. 11.

#### Life History and Habits

**Egg.** The egg of the dog flea is from .5 to .57 mm. or about 1/40 of an inch in length, elongate oval in shape and pearly white in color. The eggs are usually deposited among the hairs of the host but are not attached and are readily shaken off wherever the animal may go. Naturally the greatest numbers are found in the animal's bedding.

**Larva.** The white worm-like larva hatches from the egg in two to four days. The body has thirteen segments, a well developed head with biting mouth parts, but no eyes. The larva is legless, but each segment is provided with a few stiff hairs by the aid of which it is able to quickly wriggle into cracks and under folds of the bedding. The larvae feed upon dried blood or bits of skin from the animal or any organic material in the lint and dust in cracks and crevices. Under the most favorable conditions they may become full grown in seven or eight days, while cool weather and other factors may extend the larval stage to more than twenty days. When fully developed they are about 3.25 mm. in length, and semi-transparent, but the presence of blood in the digestive tract gives them a reddish appearance. The larvae then spin thin, white, oval cocoons which are usually covered with particles of the dirt in which they occur.

**Pupa.** The pupa developing within the cocoon is of the same general shape as the adult with the legs and appendages free. At first it is of a yellowish white color but gradually turns brown, and in five to seven days, when ready to emerge, is nearly as dark as the adult. Eggs, larvae, cocoons and pupae are shown in FIG. 12.

#### Other Kinds of Fleas

There are about 500 species of fleas known from different parts of the world, many of which are only found in tropical countries, and others only where their individual hosts occur. Twenty-six species have been listed from New York State and at least as many different kinds probably will be found in Connecticut. Many of the wild mammals

harbor one or more species and a few have been taken on some of the larger birds.

The **human flea**, *Pulex irritans* Linn., occurs all over the world and is a persistent species where it becomes established. It is especially active at night and besides attacking man, its natural host, it may live on cats, dogs, rats and other mammals.

**Rat fleas.** In addition to many species of fleas that may occur on rats, there are several species of which rats are the natural hosts. The common species in this section is the European rat flea, *Ceratophyllus fasciatus* Bosc. The Indian rat flea, *Xenopsylla cheopis* Rothsch., has been distributed by rats in ships to all the seaports in the warmer parts of the world and is one of the most abundant fleas in our southern ports. This species has been taken in New York City, but it has not become

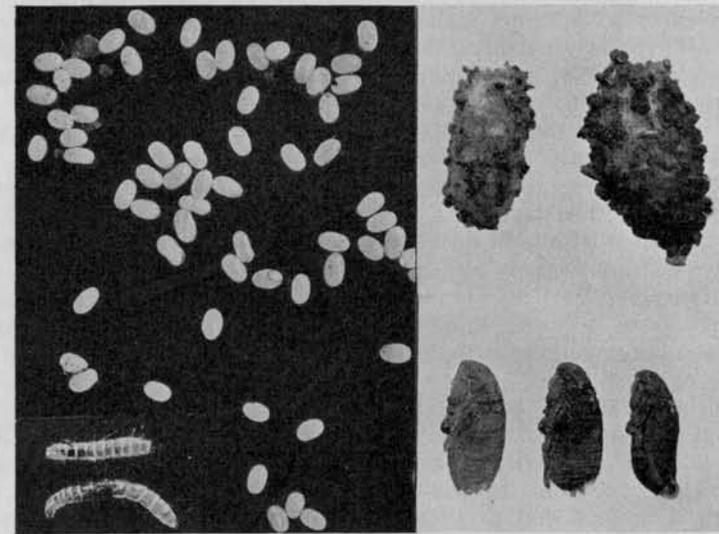


FIGURE 12. Dog flea. Eggs at left, larvae lower left, cocoons upper right, pupae lower right. Enlarged eight times.

established in sections where there are long periods of freezing weather. The Indian rat flea readily attacks man and is of great economic significance because it has been one of the principal agencies in transmitting bubonic plague from infected rats to human beings. Human fleas, as well as cat and dog fleas if they have been feeding on affected rats, may also carry the plague.

The **European hen flea**, *Ceratophyllus gallinae* Schr., is widely distributed throughout the United States and has been found in Connecticut. In neglected poultry houses this insect may become very abundant, and not only reduce the egg production but cause the fowls to lose weight and even kill them in extreme cases. The hen flea bites human beings and may be carried into the dwelling on the clothing.

### Infestations in Houses

Each year we receive reports that persons returning from vacations to their homes, which have been closed for part of the summer, find the house over-run with fleas. They ask how to get rid of them. In some cases the owner is very careful to inform us that these are sand fleas. There is a species known as the sand flea in tropical or sub-tropical countries, but sand fleas do not occur in this section. Even after admitting that they have either a cat or dog or both, it may be difficult for the owners to accept the fact that it is the common dog flea that is present in their house.

How can the fleas develop in such numbers when there has been no animal in the house for them to live on? The adults of many insect species die and are replaced by another generation, but fleas are long lived, with a comparatively short period from egg to adult, so that several generations may develop, each adding its numbers to those already present. There is no data at hand regarding the number of eggs laid by a female dog flea, but it may be as prolific as the human flea which has been observed to lay over one hundred fertile eggs.

It is well known that fleas can find sufficient food in the cracks and crevices in apparently clean houses. Old houses with floors that have wide cracks and are covered with carpets furnish ideal conditions for their existence. The larva will not develop when much disturbed, and in modern houses with tight floors, where rugs which are regularly cleaned, especially with a vacuum cleaner, are used in place of carpets, there is little danger of an infestation starting while the house is occupied. When the house is closed, however, the eggs and larvae are undisturbed, and even modern houses may be found heavily infested upon the owners' return.

The infestation may be only in the basement if the animal has slept there and has not been allowed in the rest of the house, but usually one or two rooms on the first floor, and occasionally the entire first floor, is also over-run. In one case brought to our attention last summer both floors as well as the basement were infested.

It is possible that many of these outbreaks may start from the animal's infested bedding. A short time ago the bed of a dog was examined. It was an old Morris chair cushion with a large piece of artificial leather folded over it. The dog had been bathed the preceding week and appeared to have only a few fleas on him. On his bed there was a little sand and some scattered hairs, which were shaken onto a piece of paper and brought to the laboratory. Upon examination so many eggs were found that the material was weighed and the eggs counted. The material, largely sand, weighed .3 of a gram and contained 293 eggs. Any one who keeps animals in the house might easily overlook this bedding when closing the house for the summer, but it should by all means be removed and cleaned so as to kill any stage of the fleas that may be in it.

### Treatment of Infested Houses

The owner, of course, wishes to rid the house of fleas as soon as possible. Fumigating with hydrocyanic acid gas or with calcium cyanide will readily kill the fleas, but these are not safe materials for everyone to use, and the expense of hiring the fumigating done does not appeal to the average individual just returned from his vacation.

Burning sulfur, at the rate of 3-4 pounds to each 1000 cubic feet of space is also effective, but there is a certain fire hazard in using it. In fumigating with sulfur, the sulfur should be put in a metal container which is set on top of bricks placed in a large pan partly filled with water. Although sulfur may be used in a basement, it is objectional in living quarters because it may bleach wall paper and draperies, and tarnish metal objects and fixtures.

In 1909 the late Dr. Henry Skinner published a note in the *Journal of Economic Entomology* (Vol. 2, p. 192) regarding the use of flake naphthalene in ridding a house of fleas. He took one room at a time, scattered on the floor 5 pounds of flake naphthalene and closed it for 24 hours. He states that it proved to be a perfect remedy, and very inexpensive because the naphthalene could be swept up and transferred to other rooms. We have been advising the use of this material as it is safe, effective, and cheap. One objection is the odor, another that the fumes are irritating to the eyes and air passages. In one case this summer the owner discovered the infestation in his house before his family returned. He purchased sufficient flake naphthalene to treat the whole house. Part of it was scattered over the floors and the rest was spread out thin on pieces of burlap placed on top of the radiators. A strong fire was built in the boiler, raising the temperature of the rooms to about 100° F. The house was left closed for four days. When the naphthalene was cleaned up, only about one-third of the original bulk remained. It is needless to say that there were no live fleas in the house after this treatment. While it probably was not necessary to raise the room temperature in average summer weather, a high temperature should make the treatment more effective if one wishes to fumigate with naphthalene during the cool weather.

### Ridding the Animal of Fleas

Of course the animal is directly responsible for bringing most of the fleas into the house. Therefore keeping the house pets free of fleas is attacking the problem at its source.

One of the most effective methods of ridding the dog of fleas is to wash him with a three per cent solution of creolin or four tablespoonfuls to a gallon of warm water. This not only kills the fleas but heals scratches and leaves the hair in good condition. With cats which have a more tender skin, a two per cent solution should be used. Soap flakes, two ounces to a gallon of water, can be used if creolin is not available, but the soap should be rinsed off with clear water.

Thoroughly dusting the animal with fresh pyrethrum or one of the prepared flea powders, working the material well into the hair, will kill

or stupefy the fleas. It is well to have the animal on a blanket or sheet so that the fleas that drop off can be gathered up and burned.

Occasionally in the summer when the animals are kept outside near the house, swarms of fleas appear in the grass and may be brought into the house by people walking over it. This past summer such an infestation was destroyed by thoroughly spraying the grass area with nicotine sulfate, one part to four hundred parts of water, (two teaspoonfuls to one gallon of water).

It is said that oil of pennyroyal will repel fleas and if one has to be where fleas are plentiful, a little of the oil applied to the ankles will aid in keeping them off.

### Controlling the Hen Flea

Where poultry houses become infested with the hen flea, the birds should be removed and the house thoroughly cleaned. Bury the droppings and burn all litter. All parts of the interior should be sprayed with Phinotus disinfectant using one part to ten parts of water. The ground around the house, where the litter was burned and the droppings buried, should also be sprayed. The hens as they are returned to the house should be immersed in a solution of one part of the disinfectant to 60 parts of water.