

FLEAS

E. I. McDANIEL*

The cat flea, *Ctenocephalus felis*, and the dog flea, *Ctenocephalus canis*, are the predominating species of fleas in Michigan. Both species are equally at home on cat or dog and both attack man. Fleas do not remain continually on their host animals, but drop off from time to time, and when ready to resume feeding they attack any warm-blooded animal available. The so-called "sand fleas" of the north are these waiting individuals and are not the true "sand fleas" of the south—insects which bore into the skin of the feet of man and animals.

Description—Fleas are dark, reddish-brown insects with flat, compact bodies made of chitinous segments ornamented with stiff, backward spines. The mouthparts are for piercing and sucking. The legs are long and well developed with the hind thighs abnormally thickened and fitted for jumping.

Life History—Fleas pass through four stages in their development; eggs, larva, pupa and adult. The eggs are laid on the floor, ground, furniture, or on animals. As the animal moves about, the eggs drop. This explains the rapid spread of fleas once they are established on the premises. The eggs hatch in from two to four days. The larvae complete their development in from 8 to 24 days, and from 5 to 7 days are required in the pupal stage. The tiny larvae feed on dried animal matter. When mature, they pupate within silken cocoons. The length of time required to complete a life-cycle is governed by humidity, temperature, and food supply. Adults can survive for several months without food only to make a ferocious attack upon the first warm-blooded animal to appear. This is especially true of houses closed in the early summer and not opened until fall. If, on the other hand, rats, mice or other warm-blooded animals are accessible as food supply, the fleas continue to breed in vacant houses. A meal off some warm-blooded animal seems necessary before fleas can produce fertile eggs. The population increases during the spring and early summer, assuming epidemic proportions by late summer or early fall.

Source of Infestation—The source of an infestation may be pets with so few fleas that they do not come under suspicion, or stray

*Section of Entomology.

MICHIGAN STATE COLLEGE
EXTENSION DIVISION
East Lansing

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animals infested with fleas may distribute flea eggs on the lawn, in wood sheds, garages, basements, under buildings or porches, wherever the infested animals roam. In houses, the infestation usually starts with the basement, but where infested animals have the run of the house the entire premises invariably become infested. Houses without basements, built on the ground with openings at intervals for ventilation, often serve as rendezvous for cats, dogs, chickens, and other animals. Under these conditions, fleas frequently overflow both house and lawn. Fleas in enormous numbers breed in neglected dog and fox kennels, rabbit hutches, and hog pens. Often the domestic animals, such as cats, dogs and rabbits, are commonly infested. Among wild animals the infestation is usually limited to gregarious rodents and carnivores with more or less permanent sleeping quarters or lairs. Since hogs are among the preferred host animals for fleas, many a flea epidemic can be traced to this source. It is not unusual for fleas literally to swarm about hog houses or to congregate in numbers about dry hog-wallows.

Injury—To human beings in the North, fleas are largely a source of irritation, though it is well known they are the intermediate hosts of certain parasitic worms occasionally found in man, and in some parts of the world they are carriers of disease. Some persons are immune to fleas, while others suffer only passing discomfort, but there are persons who are particularly susceptible to fleas; on those individuals, flea bites develop into large red welts which remain irritated for days or even weeks.

CONTROL

On Animals—It is possible to kill fleas on animals with either a dry or a wet shampoo. Where a powder is preferred, use a dust of either fresh pyrethrum or derris, or a combination of the two. It is sometimes desirable to dilute the powder with some inert material, such as talc, cornmeal, bran, or oatmeal. Work the powder into the fur, allowing the treated animal to stand on paper, since many of the stunned fleas tumble off and others are removed by brushing and combing. As soon as the treatment is complete, burn the paper with the accumulation of fleas, hair, and dust. If the infested animals are to receive a wet shampoo, any one of a number of commercial preparations will kill fleas. Most of these preparations contain rotenone, pyrethrum, or a saponified coal tar dip. Owing to the wide range in the strength of these different commercial preparations, it is necessary to follow the manufacturers recommendations. **In washing the animal with any insecticide, wash the head first to prevent the insects from seeking refuge around the eyes and nose.** Clean the animal's kennel or sleeping quarters. Burn the bedding or treat it in such a way as to kill fleas in all stages of their development. Also treat the floor or ground under the bed and the ground immediately around the kennel with a contact spray or dust suggested for the control of fleas on animals. As occasional treatment of crude oil on the surface of hog wallows and a rubbing post treated with crude oil will reduce the flea population in a breeding place often neglected. A kerosene or oil spray or an application of a derris dust in and around the hog house will aid the eradication campaign.

Fleas in Houses—In the basement, use a liberal application of derris powder containing at least $\frac{3}{4}$ per cent rotenone. Make a thorough application on floor, shelves and steps, because derris is a contact poison and only fleas hit are killed. The same application may be made on the remainder of the house to furniture and floors if the dust is not too objectionable. Leave the powder as long as possible and after using the vacuum sweeper, scrub the floors with water containing one of the ingredients used in defleaing animals; wipe the floors thoroughly with one of the commercial fly sprays, using sufficient quantities to kill fleas in any stage of development which may be hiding in cracks and crevices. Remove stationary rugs and carpets and either send them to the cleaner or do a thorough job of sweeping or cleaning by the vacuum sweeper. Where crystals of paradichlorobenzene are sprinkled over infested rugs and the rugs rolled to one side for a week all stages of fleas are killed. About 2 pounds of crystals is required to treat a 10- by 12-foot rug. Clean the floors thoroughly before replacing the rugs. Where one is forced to sleep in rooms infested with fleas, a liberal application of derris or pyrethrum between the sheets will give appreciable relief at least. A cheap, effective insecticide is made by combing kerosene and pyrethrum "flora grade" at the rate of one-half pound pyrethrum to each gallon of kerosene. Stir the pyrethrum into the kerosene and allow the combination to stand for 24 hours—then pour off the clear liquid and use freely as an insecticide. About 5 gallons are required to treat an ordinary basement. The liquid should be poured onto the floor and worked in with a broom. This treatment cannot be applied to vegetation because kerosene in quantities sufficient to kill fleas kills vegetation. It can, however, be used liberally on infested ground where vegetation is not to be considered. The fire hazard involved with this type of insecticide must always be considered.

Fleas on Lawns—A thorough application of a high grade derris dust ($\frac{3}{4}$ per cent) is about as effective a method of eliminating fleas from a lawn as can be suggested. Any of the contact sprays or dusts used for control of plant lice on vegetation are also effective. The application must be thorough and a sufficient quantity of insecticide used to penetrate the insect's retreat. Fleas are fond of dried blood. A bait composed of equal parts of lead arsenate and dried blood used at the rate of 10-15 pounds per acre kills fleas and is safe to use if distributed under porches or protected places, provided precautions are taken to prevent the poisoning of pets and other animals. It is not to be expected that any one insecticide or application of insecticide will eradicate fleas where the infestation is severe; two or even three radical treatments frequently are required to bring an infestation under control.

