

# Community IPM

## Flightless Leaping Ectoparasitic Arthropods = FLEAs

Adult fleas are biting insects that feed on warm-blooded animals. Worldwide, approximately 2,500 species of fleas have been identified, seven of which can affect human health. The cat flea is the most commonly observed pest species, and infests cats and dogs, occasionally biting humans and other animals. Most problems with cat fleas arise from bites, allergies and annoyance. Although fleas were less common in recent years due to effective management techniques, overuse and resistance to pesticides could increase the pest status of this insect in the future.

### Did You Know... ?

- **Death by Flea:** Bubonic plague, transmitted from rats to humans by the Oriental rat flea, killed between one quarter and one third of Europe's population in the Middle Ages. Plague cases are reported in the US every year, with 1-3,000 cases reported worldwide annually.
- **Mighty Jumpers:** Fleas jump when searching for new hosts, and to maneuver in their environment. Fleas jump by pushing off their toes, traveling up to 200 times their body length!
- **Identity by Design:** To properly identify a flea, you need to examine the presence, location and number of "combs" or spines on the insect's body.

### Identification

Adult fleas are small, measuring less than 1/6 of an inch. As an adaptation to living on animals with fur, fleas are laterally flattened (from the sides), which makes them tall and thin, allowing them to move quickly between the hairs. They are wingless, have a large pair of hind legs, and are dark brown to black in color. Fleas are most often found on their animal hosts or near nest sites.

Flea larvae are 1/5 of an inch in length, maggot-like, and not often observed. They avoid light and can develop within carpeting, cracks in floorboards, and plush furniture. These areas provide a stable environment where adequate moisture is maintained. After completing their development, flea larvae spin a silken cocoon. Initially white, flea pupal cases are sticky and attract particles from the environment, ultimately appearing as balls of lint.



The cat flea (*Ctenocephalides felis*). Photo: G. Alpert.



Female (left) and male Oriental rat flea. Photo: M. Frye.

It is important to note that biting insects cannot be identified by the mark they leave on human skin. Individuals react differently to bites, so there are no defining characteristics to distinguish bite marks. If you suspect you have fleas, it is necessary to catch the insect for proper identification (see Management below).

## Biology

Adult fleas are ectoparasites that feed on warm-blooded animals such as pets and humans. They use sucking mouthparts to pierce the skin of their host and obtain a blood meal. This provides the nourishment needed for mated females to reproduce. Eggs are often laid on the host (cat/dog) and will fall off into the host's environment. Flea eggs tend to collect in host resting areas such as pet beds.

Eggs hatch into maggot-like larvae that require high humidity to survive (50% or higher). Thick carpeting can provide a microclimate of reduced airflow that is conducive to flea development; however, pet resting sites are preferred due to the warmth and moisture generated by the host. Unlike adults, larvae are not parasitic. They feed on 'flea dirt', the feces of adult fleas that contain processed host blood and other organic material.

Larvae complete development and pupate by spinning a silken cocoon, which attracts debris to serve as camouflage. This stage provides the greatest challenge to flea control, as the pupa can remain dormant for months. In fact, the pupal case is resistant to conditions that would normally inhibit flea development, and provides some protection against pesticides. Adult emergence from the cocoon is stimulated by the presence of host cues, including vibrations from movement, heat, carbon dioxide or pressure from being stepped on. The ability to emerge in the presence of a host explains why summer homes and other vacated buildings can readily and rapidly become infested with adult fleas.

Adult fleas of both sexes require a blood meal to survive. They have relatively poor vision and attempt to find a host by jumping on to moving objects in their environment. Fleas are voracious feeders, consuming more blood daily than they need to survive. In fact, a single female can consume up to 15 times her body weight daily. The more blood that is consumed, the more flea dirt is produced, increasing food availability for developing flea larvae.

## Health Effects of Fleas

Flea bites are capable of causing irritation, transmitting disease and vectoring parasites.

- **Flea Bite Dermatitis:** Like other biting insects, fleas inject salivary gland secretions when they bite. Proteins in the saliva may cause an itchy, rash-like reaction in most individuals.
- **Murine Typhus:** Fleas, especially the Oriental rat flea, can transmit murine typhus to humans from rats, and less often from mice. Transmission is indirect, as feces containing the typhus bacteria is deposited on the skin, entering the human blood stream when the itchy bite is scratched.
- **Plague:** Rodent fleas are principle vectors in the transmission of bubonic plague between rats or from rats to humans. This transmission cycle occurs most often when fleas leave an infected rodent just after its death and bite humans.
- **Tapeworm:** Fleas are common vectors of tapeworms that infest cats, dogs, and humans. Flea larvae ingest tapeworm eggs in infested fecal matter. Eggs develop into cysticeroids inside the flea. When fleas are ingested, either accidentally (humans) or intentionally (grooming by cats/dogs), the cysticeroid is liberated from the flea body and develops into an adult tapeworm in the digestive tract of the new host.

## Management

Accurate insect identification is critical for flea management because bites produced by fleas cannot be distinguished from the bites of other arthropods, including bed bugs, mosquitoes or mites. The best way to verify a flea infestation is through monitoring. In areas of suspected flea activity, tall white socks and/or khaki pants should be worn while moving through an area suspected of being infested. Fleas jump onto moving objects, and can readily be seen against white or khaki. Fleas can be collected using a piece of clear tape or placed into a vial with rubbing alcohol. Other monitoring techniques include the use of sticky traps, or homemade traps consisting of a pan with soapy water under a desk lamp. At floor level, fleas will be attracted to the desk lamp at night, will jump toward the light and land in the soapy water. Samples can be submitted to your county cooperative extension office for identification.

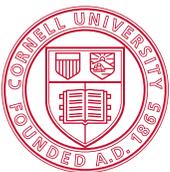
Once fleas have been identified as the pest species present, the following steps are recommended.

- Identify the source. Most often, flea problems arise from infestations on pets or unwanted wildlife living inside the structure (rodents, squirrels, etc.). Consult a veterinarian to protect your pet against fleas, and exclude wildlife from entering your home.
- Thorough vacuuming of carpets, floors, furniture and bedding will remove eggs, larvae, and adult fleas, as well as flea dirt and other organic material needed for larval development. In addition, daily vacuuming for a few consecutive days will encourage adult emergence from pupal cases because of the vibrations. It is important to remove the vacuum bag or dump canister contents in an outside trash container after each vacuuming event.
- Pet blankets, throw rugs and other washable items can be placed in the drier on high heat for 30 to 40 minutes to kill all stages of fleas. After drying items in this manner, they should be cleaned and dried as needed. (If washed prior to drying, the items might not get hot enough to kill the fleas.) While treating the items, thoroughly vacuum where these items are kept.
- Plastic pet carriers and crates can be washed using a stiff-bristled brush with hot soapy water to disinfect the item. Citrus (lemon, orange) and pine cleaners work best.
- In severe infestations, steam cleaning of furniture and carpets may be needed to treat eggs and pupal cases that are deep within carpets or other difficult to reach areas.
- Words of caution. Ultrasonic and electromagnetic devices have not proven effective in either repelling or eliminating fleas. Bug bombs or other aerosol foggers are not 100% effective against fleas, especially when larvae are living and feeding within the protected spaces of carpets. Read all labels before using an over-the-counter pest management product to determine the safety of the product for you and your family.

## **Professional Pest Management Services**

Severe flea infestations may require the assistance of a professional pest management company. These organizations have access to products such as insect growth regulators, which prevent larval fleas from maturing and reproducing. These products are an important part of integrated pest management program due to a reduced risk of non-target effects and high specificity against insect pests.

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