Ectoparasites—in addition to being a nuisance—are associated with allergies, skin infections, and self-induced traumatic injury in pets. They are also vectors of infectious and zoonotic disease-causing agents, some of which can prove fatal. Fleas, ticks, mites, and lice are common ectoparasites seen on cats in the United States.

**FLEAS**

The most common ectoparasite that infests cats (and dogs) in North America is the cat flea, *Ctenocephalides felis* (Figure 1). Other fleas also infest cats, including *Echidnophaga gallinacea, Pulex irritans,* and *P. simulans.*

*Life Cycle*

Fleas have 4 life stages:

1. **Eggs** are deposited by fed females and quickly fall into the environment; a female flea produces 40 to 50 eggs per day.
2. **Larvae** hatch from eggs in 1 to 6 days.
   - Food sources include organic debris (flea eggshells, adult flea feces) and other larval fleas.
   - Larvae develop in areas away from direct sunlight, including cool, shady areas outdoors, such as under porches or decks, and indoor locations, including carpet, furniture, and baseboards.
3. **Pupae** develop from mature larvae.
   - Adults emerge from pupal casings in as little as 2 weeks or up to 6 months.
   - Emergence is stimulated by mechanical pressure, carbon dioxide, and increased temperature.

4. **Adults** quickly find a host after emerging, and begin feeding within minutes.
   - Egg production begins around 24 hours after initiation of feeding.
   - Adults account for only about 5% of the total flea population in an infestation.
   - Emergence is stimulated by mechanical pressure, carbon dioxide, and increased temperature.

*Significance of Infestation*

Fleas can cause irritation and pruritus, and certain cats may develop flea allergy dermatitis. Heavy infestations can lead to anemia and, if not managed appropriately, can be fatal.

Fleas are also important vectors of disease-causing agents. They can transmit *Dipylidium caninum* and bacteria that cause bartonellosis, hemotropic mycoplasmosis, rickettsiosis, plague, and tularemia; many of the aforementioned agents can infect humans as well.
Treatment Strategies
Eliminating flea infestations can be challenging, and many factors must be considered:
- Killing the fleas on the patient
- Eliminating eggs, larvae, and pupae in the environment; as these life stages mature, they will continue to infest the pet
- Identifying additional untreated pets, feral animals, or peri-domestic wildlife that contribute to environmental contamination
- Choosing products that address difficult-to-treat life stages: Larvae and eggs may be located in hard-to-reach areas (eg, deep within the carpet) and pupae can withstand many chemical treatments.

Implementation of an integrated pest management strategy is often necessary to resolve flea infestation:
1. Routinely apply approved, persistent flea-control products to every pet in the home year-round (Table 1):
   - Insecticides to kill the adult fleas
   - Insect growth regulators and insect development inhibitors, which prevent maturation of immature flea stages
2. Treat the environment:
   - Mechanically remove immature stages by laundering flea-contaminated items and frequently vacuuming
   - Apply premise sprays to accelerate death of some immature flea stages in the environment
   - Address sources of continued environmental contamination.

Note that many drugs are formulated to treat ectoparasites, but some that are safe for use in or on dogs are not safe for use in cats due to potential adverse effects, including death. Follow label instructions carefully.

TABLE 1. Flea-Control Products Available for Cats in the U.S.

<table>
<thead>
<tr>
<th>INSECTICIDES TO KILL ADULT FLEAS</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Topical (1-month efficacy)</strong></td>
<td>• Dinotefuran</td>
</tr>
<tr>
<td></td>
<td>• Etofenprox</td>
</tr>
<tr>
<td></td>
<td>• Fipronil</td>
</tr>
<tr>
<td></td>
<td>• Imidacloprid</td>
</tr>
<tr>
<td><strong>Oral</strong></td>
<td>• Nitenpyram (Q 24 H or as needed)</td>
</tr>
<tr>
<td></td>
<td>• Spinosad (1-month efficacy)</td>
</tr>
<tr>
<td><strong>Collar (8-month efficacy)</strong></td>
<td>• Flumethrin</td>
</tr>
<tr>
<td></td>
<td>• Imidacloprid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INSECT GROWTH REGULATORS &amp; DEVELOPMENT INHIBITORS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topical (1-month efficacy)</strong></td>
<td>• Methoprene</td>
</tr>
<tr>
<td><strong>Oral (1-month efficacy)</strong></td>
<td>• Pyriproxyfen</td>
</tr>
<tr>
<td><strong>Injectable (6-month efficacy)</strong></td>
<td>• Lufenuron</td>
</tr>
</tbody>
</table>

TICKS
Ticks, although more common on dogs, can infest cats as well. The most common ticks found on cats in the U.S. are *Amblyomma americanum*, *Dermacentor variabilis*, *Ixodes scapularis*, and *Otobius megnini* (Figure 2); however, other tick species, such as *Rhipicephalus sanguineus*, occasionally infest cats.

![Figure 2: Larva, nympha, and adults of *Amblyomma americanum* (A); adults of *Dermacentor variabilis* (B) and *Ixodes scapularis* (C); and a nymph of *Otobius megnini* (D). Courtesy National Center for Veterinary Parasitology, Oklahoma State University](image)

Life Cycle
Life cycles differ greatly between hard and soft ticks. For hard ticks—*A. americanum, D. variabilis*, and *I. scapularis*—3 different hosts are required to complete the life cycle:
1. A blood-engorged female deposits a single clutch of thousands of eggs into the environment; from...
those eggs hatch 6-legged larvae that find the first host.

2. Larvae attach and feed for a few days before falling off and molting in the environment into 8-legged nymphs. Nymphs find another host, feed for days to a week, and fall into the environment, molting to the final stage—8-legged adult male and female ticks.

3. Adult ticks find hosts and feed for 1 to 2 weeks; engorged, mated females detach before laying their egg clutch.23

For the soft tick—*O megmini*—only one host is required to complete its life cycle:18

1. The female can lay several clutches of eggs in the environment.

2. When the larvae hatch, they obtain a host, crawling into the ear canal, feeding, and molting into the first and second nymphal stages.

3. Second-stage nymphs crawl out of the ear canal and enter the environment, molting into the nonparasitic adult stage; the adults mate off-host. Geographic distribution and host preferences differ among tick species (Table 2).18-22

### Significance of Infestation

As seen with flea infestations, ticks are associated with irritation, pruritus, anemia, and potential secondary bacterial skin infections; furthermore, due to the attachment and feeding practices of most ticks, severe skin reactions at the bite site can occur.4,16-18,21

- *O megmini* exclusively infests the ears, resulting in inflammation of the ear canal.23
- Attachment of *D variabilis* has been associated with a paralytic condition that resolves upon tick removal.18

### Treatment Strategies

Tick control, similar to flea control, can be challenging, and also requires an integrated pest management strategy.18,19

CAPC recommends keeping cats indoors to protect them not only from ticks but from other parasitic infections. However, for cats that do venture outdoors, or those that share their living spaces with dogs, control ticks by:

1. Using a tick-control product (acaricide) approved for cats, such as:
   - **Topical** (1-month efficacy): etofenprox, fipronil
   - **Collar** (8-month efficacy): flumethrin

2. Implementing environmental management strategies:
   - Limiting exposure to areas conducive to ticks
   - Excluding wildlife from areas near the house
   - Manicuring lawns and removing brush piles and leaf litter (“tick-scaping”)
   - Applying acaricides to yard and perimeter.

### MITES

Cats can be infested with several mite species; the most common are *Otodectes cynotis, Notoedres cati*,
Demodex cati, and D gatoi (Figure 3). Cheyletiella blakei, Lynxacarus radovskyi, and Sarcoptes scabiei rarely infest cats in the U.S.3,16,29-31

Life Cycle
The generic mite life cycle involves eggs, larvae, 2 nymphal stages, and adults, and takes 3 to 4 weeks to complete. All stages of mites can live in tunnels burrowed through the skin, within hair follicles, or on the surface of the host's skin, but preferred sites of infestation depend on the species (Table 3).3,30,31

Mites are transmitted between hosts by direct contact with an infested animal.

Significance of Infestation
Infestation with mites generally results in local irritation and pruritus, but may progress to alopecia, exfoliative dermatitis, hyperkeratosis, or self-mutilation.17,29,31

All of the feline mite species discussed—other than Demodex species and L radovskyi—have been associated with transient infestations of humans.2,30

Treatment Strategies
Treatment of mite infestations is more straightforward than treatment of fleas or ticks.

• Topical heartworm preventives for cats (selamectin or moxidectin/imidacloprid) are labeled to treat O cynotis; topical acaricides designed for use in the ear (ivermectin or milbemycin oxime) can also be used to treat O cynotis.3,30

• For other mite species that can infest cats, macrocyclic lactones or fipronil are recommended; multiple doses are required to treat most infestations.3,30,31

• Addition of antibiotics may be necessary if a secondary bacterial infection is present. Since mites are transmitted through direct contact, treatment of all other cats in the household is necessary to prevent reinfection; O cynotis also necessitates treatment of dogs and ferrets.30 Decontamination of bedding and grooming supplies is also recommended because some mites may survive off-host for short periods.3,30

LICE
Lice are a rather uncommon finding in cats that are receiving flea control; however, lice do infest cats on occasion, especially young, old, debilitated, or neglected cats.3,16 Felicola subrostratus is the chewing louse of cats (Figure 4).3

Life Cycle
Completion of the louse life cycle takes 1 to 2 months:3,16,32

1. The female lays many eggs throughout her life and cements them to the hair of the host.
2. A nymph hatches from the egg in 1 to 2 weeks; nymphs feed on tissue debris and undergo 2 additional molts to become adults.
3. Adults also feed on tissue debris and mate while in the haircoat of the cat.

Significance of Infestation
Chewing lice attach at the base of the hair and

### TABLE 3. Preferred Sites of Infestation by Mite Species

<table>
<thead>
<tr>
<th>MITE SPECIES</th>
<th>PREFERRED SITE OF INFESTATION</th>
</tr>
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<tbody>
<tr>
<td>C blakei</td>
<td>Dorsum</td>
</tr>
<tr>
<td>D cati</td>
<td>Face and neck</td>
</tr>
<tr>
<td>D gatoi</td>
<td>Abdomen and inside of upper hindlimbs</td>
</tr>
<tr>
<td>L radovskyi</td>
<td>Perineal and tail areas</td>
</tr>
<tr>
<td>N cati</td>
<td>Pinnae, face, and distal extremities</td>
</tr>
<tr>
<td>O cynotis</td>
<td>Ear canals</td>
</tr>
<tr>
<td>S scabiei</td>
<td>Ears, elbows, and hocks</td>
</tr>
</tbody>
</table>
and tools to: veterinary team is equipped with the knowledge from these parasitic invaders, and the humans. Our clients want to protect their pets (and parasites can be quite severe in both cats and disease in our feline patients, whether directly

There is no shortage of ectoparasites that cause

TRTMENT STRATEGIES

Treatment of lice requires:

- Use of an insecticide on the cat, including topical spot-on, shampoos, sprays, or powders; fipronil, imidacloprid, and selamectin are effective at killing lice.16,32,33
- Decontamination of bedding and grooming supplies—fomites on which eggs may be located—by placing them in a clothes dryer for several hours.3
- Lice are very species specific; there is no risk for transmission of lice to humans or pets other than cats.16

IN SUMMARY

There is no shortage of ectoparasites that cause disease in our feline patients, whether directly or indirectly. The diseases associated with these parasites can be quite severe in both cats and humans. Our clients want to protect their pets (and themselves) from these parasitic invaders, and the veterinary team is equipped with the knowledge and tools to:

- Educate clients about these parasites
- Treat the current infestation
- Implement strategies to prevent future infestations.

Many safe and effective products are available for routine use in cats. Some products not only control the ectoparasites discussed in this article but also prevent or treat other parasitic infections.15 CAPC recommends broad-spectrum parasite control for every pet year-round; visit capcvet.org/resource-library for a comprehensive summary table of available ectoparasite control products for use in cats.

References

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