VMP 930
Veterinary Parasitology

Fleas
Siphonaptera - Fleas

- Laterally flattened
- Eggs, larvae, pupae, adults
- Adults feed on blood, larvae feed on detritus including flea feces
Fleas of minor importance

- *Pulex irritans* - human flea - may be on pets
- *Xenopsylla cheopisis* - Oriental rat flea - rodents - *Yersinia pestis* - plague
- *Echidnophaga gallinacea* - stick-tight flea - birds, dogs, man - embeds in host
Fleas of Veterinary importance

*Ctenocephalides* spp.

- most fleas on dogs and cats in NC are *C. felis*
Ctenocephalides life cycle

- Complex metamorphosis
- Temperature of 13-32°C
  (>35°C lethal to larvae and pupae)
- Relative humidity of 50-92%
- ~14-28 days (max of ~140 days)
- Eggs usually laid on host & fall to ground
- Unfed adults may survive ~2 months
Ctenocephalides life cycle

**Adult**
- Female: 4 mm long
- Male: 2 - 3 mm long
- Take several blood meals daily.

**Eggs**
- White: 0.5 mm long
- Eggs laid on pet (25 - 40 eggs per day).
- Eggs fall off pet and hatch in environment.
- Hatch in 2 - 5 days.

**Pupa**
- 2 - 4 mm long
- Pupa in silk cocoon with debris collected on outside.
- Fleas emerge 1 - 2 weeks in environment.
- Delayed emergence up to 4 months.

**Life Cycle of the Cat Flea**
*CTENOCHEPHALIDES FELOS*

**First Stage Larva**
- 1 - 2 mm long

**Second Stage Larva**
- 2 - 3 mm long

**Third Stage Larva**
- 3 - 5 mm long

Illustration by: Scott Charlesworth, Purdue University
Flea Population

- Adult fleas only account for 5% of the total flea population.

- The other 95% are the eggs, larvae, and pupae that remain hidden in carpets, furniture, dog bedding, and the garden, waiting to develop and jump onto the dog.
Flea Ecology

- Adults rarely leave host
  - exception >200 fleas/individual
- May bite other hosts, e.g., man if dog/cat not available
- Diagnose by observing fleas, 'flea dirt', effects of bites
Flea Ecology

- Adult fleas prefer the back, neck, and ventral (underside) regions of pets.
  - Fleas are less likely found on the legs and tail.
  - Host grooming habits affects distribution of adult fleas on the host.
Effects on host

- Blood loss - can produce anemia especially in young animals if infestation severe
- wound production
- allergy - flea bite dermatitis
- disease transmission
  - *Diplylidium caninum*
  - *Dipetalonema reconditium*
Flea bite allergy

- More than 15 substances injected by fleas capable of eliciting an allergic response
- Diagnose with intradermal skin test
- Once allergic, always allergic
- A single flea is capable of eliciting a severe rx in allergic animal
- Treatment may include steroids - use for only short periods of time
- Eliminate fleas!!!!!!!
Flea Allergy Dermatitis

Flea punctures skin to feed.
Flea saliva sets up an antigen-antibody reaction.
Excoriation and Inflammation result from self-inflicted trauma.
Acute bacterial infection results.

Sequence of flea-allergy dermatitis

Self-inflicted trauma results in erythema, papules, pustules, crusts, and hair loss in areas where fleas feed.

Flea-Allergy Dermatitis

Diagnostic Plan
- History
- Physical examination
- Detection of fleas, flea dirt, and tapeworm segments
- Intradermal skin testing

Therapeutic Plan
- Flea control
- Short-term corticosteroids

Dietary Plan
A diet adequate for tissue repair

Images:
A, B, C, D
Flea Allergy Dermatitis
Flea Control

- **LARVICIDES**
  - Insect growth regulators (IGR’s)
    - lufenuron (Program) - Chitennase inhibitors
    - Sentinel - lufenuron + milbemycin
  - Juvenile hormone analog
    - Precor - methoprene - spray or collar

- **May take up to 3 months to achieve control with Larvicides only**
Flea Control

ADULTICIDES

- Advantage - imidacloprid (fleas only) - nicotinic receptor
- Frontline Top Spot - fipronil (fleas and ticks) - GABA regulated ion channels - reports of resistance currently undocumented by laboratory studies
- Revolution - selemectin - fleas, heartworm, Otodectes
- Capstar - nitenpyran - oral/daily/rapid kill
- Dozens of products, read label instructions carefully

- Natural products, e.g., citrus oil may be toxic for cats, liquid dishwashing soap, etc
Insecticide resistance

- *Isolates of C. felis* have been found to be resistant to various insecticides
  - (DDT, dieldrin, malathion, chlorpyrifos, diazinon, propetamphos, bendiocarb, cyfluthrin, cypermethrin, fluvalinate, permethrin, pyrethrin, and carbaryl)

- Resistance to topical adulticides is currently being investigated
Other means of flea control

- Environmental modification - vacuum home
- Sanitation to remove eggs, larvae and food source
- Pesticide treatment of host and/or environment
- Natural predators: *Steinernema carpocapsae* - nematode
How would one control *Ctenocephalides* in the following situations?

- A completely indoor cat that has flea bite allergy.
- A group of dogs in an outside kennel.
- A household with a completely indoor cat (not allergic) and a dog that spends time both indoors and outdoors.