

# MITES: WHAT'S BURROWING UNDER YOUR DOG'S AND CAT'S SKIN

Michael W. Dryden DVM, MS, PhD, DACVM (parasitology)  
University Distinguished Professor of Veterinary Parasitology  
College of Veterinary Medicine  
Kansas State University  
Manhattan KS 66502

## ❖ Sarcoptic mange

- **Species**
  - *Sarcoptes scabiei* var. *canis* - "Scabies"
  - *Notoedres cati* - "Face mange"
- **Hosts and Geographic distribution**
  - *Sarcoptes scabiei* - All domestic animals and humans (rare in cats); Worldwide
  - *Notoedres cati* - Cats; rarely on dogs; Worldwide – in U.S. primarily southeastern states
- **Morphology** - Small, roughly circular, Female 330-600 µm, Male 200-240 µm; All legs of both sexes are short, Dorsal surface with folds, and grooves (transverse), *Sarcoptes* covered with triangular spines, *Notoedres* has a "thumbprint" pattern of folds; no spines (240 x 200 um)
- **Life Cycle**
  - Female burrows into skin; forms a tunnel and lays eggs in it; lays 40-50 eggs (3-5 eggs laid daily). Eggs hatch in 3-5 days into a 6-legged larva. May stay in tunnel or wander on skin. If stay in tunnel, molt to nymphs. (2 nymphal stages, make new feeding pockets. Short life cycle = rapid buildup of mites. Nymphs 8-legged. ----> Adult males and females (17-21 days from egg to adult; rapid increase in number of mites. Female stays in feeding pocket (molting pocket) until fertilized. Then extends pocket into a tunnel; lays eggs in 4-5 days. Infection spread through contact.
  - *Notoedres* are found in-groups "nests" in tunnels; *Sarcoptes* adult females found singly.
  - Mites don't live very long off the host. At 68 - 77 F live 5 to 6 days if humidity is above 75%
  - Egg <sup>3-5 days</sup> larvae (6 legs) <sup>burrow, feed</sup> Nymph (8 legs) <sup>burrow, feed</sup> Nymph (8 legs) <sup>burrow, feed</sup> Adults
  - Highly contagious - Transmitted 1° by intimate contact with skin. (Incubation period depends on site of infestation, number of mites (2 weeks ----> 6 weeks)
- **Pathology**
  - Inflammation result of hypersensitivity produced by host reaction to mite feces and exuviae & secretion of allergens to which the host becomes sensitized
  - Skin reacts with acanthosis, hyperkeratosis, vascular dilatation and cellular infiltration of the upper dermis.
  - Pruritus also may be associated with: Mechanical irritation by the mite and toxic materials produced by the mite & Mites pierce skin to suck lymph and may feed on epidermis
- **Clinical Signs**
  - Pruritus! Intense pruritus is the most common complaint. May develop anytime from 10 days to 8 weeks after contact with infected animal.
  - Alopecia, Papulocrustous eruption with thick, yellow crusts and excoriation. Areas most affected are thin skinned areas: ventral abdomen, chest, ears, elbows, ventrum (Back is usually spared). With chronic cases lesions can become generalized, Peripheral lymphadenopathy (secondary pyoderma), Debilitation / emaciation / death
  - Notoedric mange in cats: pruritus, alopecia of face, ear tips and distal extremities. Can progress to hyperpigmentation, secondary pyoderma and self-mutilation.

- **Diagnosis**
  - History! Rapid onset of pruritus and distribution of lesions
  - Skin scrapings; Scrape new, apparently unaffected skin as well as erythematous areas, Mount in mineral oil and look for mites with characteristic dorsal spines.
  - May find mites in only 50% of cases.
  - Do multiple superficial skin scrapings (10) mites difficult to find look for eggs, mites or parts of mites.
  - ELISA antibody test experimental 84.2% sensitivity and 89.5% specificity.
  - Not commercially available in U.S.
  - Scrape or comb seborrhic debris and digest debris in 10+% KOH; heat gently for a few minutes & centrifuge in a sugar float.
  - CBC (75% Eosinophilia)
  - Best diagnostic aid is response to therapy. **“Therapeutic trial”**
- **Treatment**
  - Scabies treatment
  - Selamectin (Revolution; Zoetis) **FDA approved:** 6 – 12 mg/kg spot-on; day 0, & 30; clinical resolution can be quickened using the alternate application regimen –Day 0, 14, & 30. In infested kennels or refractory cases an additional dose on day 60 may be needed.
  - Imidacloprid/moxidectin (Advantage Multi) **FDA approved:** 2 -4 topical doses 4 weeks apart.
  - Fipronil spot-on and spray (0 & 30 days) control label only
  - **While not approved, the treatments listed below have been used.**
    - The new isoxazolines (afoxolaner, fluralaner, lotilaner and sarolaner) have all demonstrated excellent efficacy against Sarcoptes in dogs.
    - Ivermectin oral or Sub Q at 200 to 400 µg/kg every 14 days for 3 to 4 treatments is commonly used. Do not use in Collies and other susceptible breeds.
      - MDR1 deletion mutation (ABCB1-Δ1) associated with ivermectin sensitivity
      - The phenomenon of ivermectin toxicity in Collies was first described in 1983. Ivermectin causes neurologic toxicity in dogs with the specific gene mutation at doses that are more than 10x lower than the dose required to cause toxicity in other dogs. Neurologic manifestations of ivermectin in susceptible dogs include: hypersalivation, ataxia, blindness, coma, respiratory compromise, and death.
      - Lowest dose found to produce toxicity in dogs that are homozygous for the mutated gene is approximately 125µg/kg.
      - Over half of tested Collies (70%) have the mutated gene. The mutated gene has also turned up in 65% of Longhaired Whippets, 50% of miniature Australian Shepherds, 50% of Australian Shepherds, 30% of Silken Windhounds, 15% of English Shepherds, 15% of Shetland Sheepdogs, 10% of German Shepherds, about 5% of mix breeds tested and <5% of Border Collies.
      - Neff MW. et al. Breed distribution and history of canine mdr1-1Δ, a pharmacogenetic mutation that marks the emergence of breeds from the collie lineage. Proc. Nat. Acad. Sci. 101(32)11725-11730, 2004.
      - Before using in susceptible breeds a test is available at Washington State (blood or cheek swab)
      - <http://www.vetmed.wsu.edu/depts-VCPL/>
        - For 1-4 tests included in a single shipment the cost is \$70 per test
    - Milbemycin oxime orally 2 mg/kg (0, 7, 14, & 21 days or 0, 14 and 28 days)
    - Imidacloprid/moxidectin (Advantage Multi®) 2 doses 4 weeks apart.
  - Pyoderma must be treated (antibiotics; culture and sensitivity)
  - Treat all in-contact dogs and cats (highly contagious)
  - Control pruritus (corticosteroids)
  - In commercial facilities treatment of premises rarely necessary (mites can live off host 2-3

- days) – diazinon or permethrin sprays
- Remember: Because Scabies mites are difficult to demonstrate; mange is one of the most commonly missed diseases (usually misdiagnosed as allergy). **If you think it is mange -- Treat it!** May last for years without treatment
  - Notoedres (no approved treatments)
    - Selamectin (Revolution; Zoetis) 6mg/kg spot-on; day 0, & 30. Studies indicate that a single dose is 100% curative.
    - Imidacloprid/moxidectin (Advantage Multi) day 0, & 30. Data indicates that a single dose is 100% curative.
    - Ivermectin 300 µg/kg (125 µg/lb) orally or subcutaneous injection
  - **Public Health**
    - Humans often get self-limiting (12 – 14 days) pruritus and rash.
    - Under rare situations mites contracted from dogs is not self-limiting in humans
    - Occasionally the diagnosis of Scabies in dogs is made because the owner is itching or you itch several days after handling infested dogs
    - *Sarcoptes scabiei* var. *hominus* is human Scabies mite
  - **Selected References:**
    - Becskei C. et al. Efficacy and safety of a novel oral isoxazoline, sarolaner (Simparica®), for the treatment of sarcoptic mange in dogs. *Vet Parasitol.* 2016 Feb 20.
    - Beugnet F, de Vos C, Liebenberg J, Halos L, Larsen D, Fourie J. Efficacy of afoxolaner in a clinical field study in dogs naturally infested with *Sarcoptes scabiei*. *Parasite.* 2016; 23:26. 2016.
    - Curtis CF. Current trends in the treatment of *Sarcoptes*, *Cheyletiella* and *Otodectes* mite infestations in dogs and cats. *Vet Dermatol.* 2004 Apr; 15(2):108-14.
    - Fourie LJ, Heine J, Horak IG. The efficacy of an imidacloprid/moxidectin combination against naturally acquired *Sarcoptes scabiei* infestations on dogs. *Aust Vet J.* 84(1-2):17-21, 2006.
    - Kwochka KW. Mites and Related Disease. In: the Veterinary clinics of North America, Small animal Practice, ed by RP Grieve. Philadelphia, WB. Saunders 17:1263-1284, 1987.
    - Lower KS, Medleau LM, Hnilica K, Bigler B. Evaluation of an enzyme-linked immunosorbent assay (ELISA) for the serological diagnosis of sarcoptic mange in dogs. *Vet Dermatol.* 2001 Dec; 12(6):315-20.
    - Neff MW. et al. Breed distribution and history of canine *mdr1-1Δ*, a pharmacogenetic mutation that marks the emergence of breeds from the collie lineage. *Proc. Nat. Acad. Sci.* 101(32)11725-11730, 2004.
    - Romero C, Heredia R, Pineda J, Serrano JA, Mendoza GD, Trápala P, Cordero AM. Efficacy of fluralaner in 17 dogs with sarcoptic mange. *Vet Dermatol.* 2016 Oct;27(5):353-e88.
    - Shanks DJ, McTier TL, Behan S, Pengo G, Genchi C, Bowman DD, Holbert MS, Smith DG, Jernigan AD, Rowan TG. The efficacy of selamectin in the treatment of naturally acquired infestations of *sarcoptes scabiei* on dogs. *Vet Parasitol.* 2000 Aug 23; 91(3-4):269-81.
    - Six RH, Clemence RG, Thomas CA, Behan S, Boy MG, Watson P, Benchaoui HA, Clements PJ, Rowan TG, Jernigan AD. Efficacy and safety of selamectin against *Sarcoptes scabiei* on dogs and *Otodectes cynotis* on dogs and cats presented as veterinary patients. *Vet Parasitol.* 2000 Aug 23; 91(3-4):291-309.
    - Taenzler J, Liebenberg J, Roepke RK, Frénais R, Heckerth AR. Efficacy of fluralaner administered either orally or topically for the treatment of naturally acquired *Sarcoptes scabiei* var. *canis* infestation in dogs. *Parasit Vectors.* 2016 Jul 7;9(1):392

## ❖ Demodicosis – Canine Demodectic Mange, Follicular Mange, Red Mange

- **Species**
  - *Demodex canis* (*Demodex folliculorum* var. *canis*)
  - *Demodex spp* occurs in all species of domestic animals and humans. Usually named after the host (e.g., *Demodex canis*.) Worldwide. Additional short bodied and long bodied forms have been described.
  - *Demodex injai* (long bodied form – inhabits sebaceous glands)
  - Also unnamed short-bodied species tentatively named *Demodex cornei* (more superficial)
- **Morphology**
  - Adults: Male 40-250 µm; Female 40-300 µm; Cigar-shaped with four pairs of short-stumpy legs anterior
- **Life cycle:** Egg --> Larva (6 legs) --> nymph (8 legs) --> adult (8 legs; 20-35 days)
  - Normal inhabitant of the skin of many dogs; over population and disease occurs in dogs with defect in immune system.
  - Mites in hair follicles (sometimes in adjacent sebaceous and apocrine sweat glands)
- **Demodectic mange is not considered to be a contagious disease (compare Sarcoptic mange)**
  - Predisposition to overpopulation of mites and development of clinical disease is not completely clear, but Juvenile On-Set Generalized Demodectic Mange is an inherited disease and research suggests it may be an autosomal recessive mode of inheritance.
- **Pathology & Disease Forms**
  - Localized Demodectic Mange
    - Dogs < 1 year of age, self-limiting, not related to immune defect or heredity. A small percentage (≈10%) of localized cases may progress to Juvenile On-Set Generalized Demodectic Mange.
  - Juvenile Onset Generalized Demodicosis
    - Has long been considered to be the result of an inherited immunologic defect, which is a functional abnormality associated with the cell-mediated (T-Cell) immune system. There is good evidence supporting the hereditary predisposition for developing generalized demodicosis. The disease is common in certain breeds of purebred dogs and also within certain lines within breeds. In addition, several littermates are often affected and certain bitches may produce several affected litters. The American Society of Veterinary Dermatologists states that dogs with Juvenile Onset Generalized Demodicosis should not be used for breeding.
  - Adult-Onset Demodicosis
    - Dogs >1 year of age; often in much older dogs. Typically associated with/triggered by some neoplastic process or debilitating disease that may be producing immunosuppression; such as malignant lymphosarcoma, malignant melanoma, hyperadrenalcorticism, hypothyroidism, diabetes mellitus, Cushings Disease etc.
- **Clinical Signs**
  - Localized Demodectic Mange
    - Well-demarcated areas of alopecia, erythema and scaling
    - Usually confined to areas around the lips, peri-orbital area, and forelimbs.
    - Usually no pruritus or 2° pyoderma
    - Generally self-limiting and not related to immune defect or heredity.
  - Juvenile Onset Generalized Demodicosis
    - Extensive generalized involvement or a number of localized lesions
    - Initial lesions of Juvenile Onset Generalized Demodicosis are similar to Localized Demodicosis (confined to lips, periorbital & forelimbs but often will progress over body).
    - Pruritus is a frequent complaint due to 2<sup>o</sup> bacterial infection
    - Erythema, alopecia, oily seborrhea, edema, and crusts

- Peripheral lymphadenopathy +/-
  - Febrile +/-, anorexia +/- and debilitated +/-
  - Occurs primarily in purebred dogs
  - Dogs <1 year of age
  - A small percentage ( $\approx 10\%$ ) of localized cases will progress to generalized
  - Feet may be involved
  - Adult-Onset Generalized Demodicosis
    - Signs similar to Juvenile Onset Generalized Demodicosis but in older dogs
  - **Diagnosis**
    - Deep skin scrapings (Pinch up an area, and scrape deep enough to get some blood)
    - Since the mites are normal inhabitants of the skin the demonstration of a single mite does not confirm a diagnosis of demodicosis.
    - Typically you will find large numbers of adults or excessive immature forms
    - Rarely mites may be difficult to find
    - Re-scrape if you suspect *Demodex* but find no mites!
    - Skin scrape is **under-utilized!**
  - **Therapy**
    - Note the treatment for localized and generalized forms are **completely** different. Therefore, understanding the difference between the two forms and proper diagnosis is critical.
    - Localized
      - Most dogs with Localized Demodicosis have no immunologic defect, prognosis is excellent.
      - If lesions are asymptomatic and owner understands lesions should resolve spontaneously, no Rx necessary. Lesions will resolve in 3-8 weeks.
      - If a case of true localized demodicosis becomes generalized, it was destined to do so, and failure to institute therapy was not responsible for spread of the disease (know your owner!)
      - If lesions are pruritic or owner cannot understand scientific neglect, institute localized therapy such as benzoyl peroxide gel.
      - Aggressive miticidal therapy may prevent identification of dogs that would have developed generalized disease and potentially allowing them to pass on the trait if used for breeding.
    - Generalized
      - Prognosis for generalized demodicosis **always** guarded and may be poor.
      - Successful treatment depends on severity of pyoderma, immune status of dog, and communication with owner. Discuss pathogenesis and genetics of disease with owner.
      - If a dog is less than 1 year of age, may self-cure in 50% of cases. (If breeding history shows chronic Demodex in kennel, self-cure is unlikely.)
      - Treatment for either form of Generalized Demodicosis may be **prolonged, expensive and no guarantee of success.**
1. Amitraz (Mitaban<sup>R</sup>) dip. Various treatment protocols exist with dipping schedules weekly to every two weeks and concentrations varying from 0.025 to 0.06% applied weekly or every 2 weeks. However, the **approved** usage is 0.025% every two weeks.
    - Labeled protocol - Amitraz (Mitaban<sup>R</sup>) Use one bottle per 2 gallons of water. The entire dog should be wet thoroughly. Don't wipe; let the dog air-dry. Use fresh every 14 days until no mites are found for 2 successive treatments.
      - Medium and longhaired dogs must be clipped prior to dipping.
      - May take 4 to 12 or more treatments; rarely some dogs refractory to treatment
      - Side effects of amitraz are common & include depression, ataxia, polyphagia/polydipsia, vomiting and diarrhea.

- Conducting regular skin scrapings monthly, monitoring for decrease in mite numbers assesses treatment success.
  - Treatment should continue 4 weeks after scrapings show no mites.
  - Once mites eliminated; follow-up exams at 6 to 12 months. Relapse may occur
2. Alternative therapies: If mite numbers do not decrease or lesions have not cleared after several weeks, alternative therapies should be considered.
- **Note, while Amitraz is the only approved treatment in the U.S. the new isoxazolines appear to be the primary treatment option at this time.**
  - Fluralaner (Bravecto®; oral or topical), Lotilaner (Credelio®) Sarolaner (Simparica®), Afoxolaner (Nexgard®). At standard approved oral doses for flea and tick control these isoxazolines are generally 100% effective against generalized demodicosis. Data shows that a single treatment is sufficient with fluralaner, whereas, three monthly treatments should be used with afoxolaner, lotilaner and sarolaner to treat juvenile on-set generalized demodicosis. For adult on-set generalized demodicosis treatments may have to extend to 4 months for some dogs and recurrence within a year following treatment has rarely occurred. The isoxazolines are currently considered primary treatments and standard of care for Generalized Demodicosis.
  - Ivermectin (300 to 600µg/kg) orally once daily for 60 to 90 days
    - Do not use in any dog with MDR-1 gene mutation.
    - Do use in dogs currently being given spinosad flea products
    - Either check for the gene mutation or conduct a “step up” dosing regimen.
    - 50µg/kg day 1, 100µg/kg day 2, 150µg/kg day 3, 200µg/kg day 4& 300µg/kg day 5  
Then continue daily at 300µg/kg to 600µg/kg.
  - Moxidectin/imidacloprid (Advantage multi) once weekly
  - Milbemyacin oxime (0.5 – 2.0mg/kg) orally once daily for 60 to 90 days
    - Note that dogs that are homozygous for the MDR-1 gene mutation may develop ataxia with milbemyacin oxime given daily at 1.5mg/kg. – Currently not available as a single drug in the U.S.
- Treatment protocols should include antibacterial treatment for secondary pyoderma.
- **Selected References:**
- Beugnet F, Halos L, Larsen D, de Vos C. Efficacy of oral afoxolaner for the treatment of canine generalised demodicosis. Parasite. 2016;23:14.
  - Burkett, G, Frank LA, Bailey EM, Schneitzel LP, Kania SA. 1996. Immunology of dogs with juvenile-onset generalized demodicosis as determined by lymphocyteblastogenesis and CD4:CD8 analysis. J Vet. Aller. Clin. Immunol. 4:46-52.
  - Chavez, F. Case report of afoxolaner treatment for canine demodicosis in four dogs naturally infected with Demodex canis. Int J Appl Res Vet Med 14(2): 123-127, 2016
  - Flourie JJ et al. Efficacy of orally administered fluralaner (Bravecto™) or topically applied imidacloprid/moxidectin (Advocate®) against generalized demodicosis in dogs. Parasit Vectors. 2015; 8: 187.
  - Paradis, M. and E. Laperriere. 1992. Efficacy of daily Ivermectin treatment in a dog with Amitraz-resistant generalized demodicosis. Vet Dermatol 3:85-88.
  - Reedy, L.M. 1986. Common parasitic problems in small animal dermatology. JAVMA 188:362-364.
  - Ristic, Z. 1993. Ivermectin in the treatment of generalized demodicosis in the dog. Vet Dermatol. 4:40-41.
  - Sarkar P, Mukherjee J, Ghosh A, Bhattacharjee M, Mahato S, Chakraborty A, Mondal M, Banerjee C, Chaudhuri S. A comparative analysis of immunorestitution and recovery with conventional and immunotherapeutic protocols in canine generalized demodicosis: a newer

- insight of immunotherapeutic efficacy of T11TS. *Immunol Invest.* 2004;33(4):453-68.
- Scott, D.W., B.R.H. Farrow, and R.D. Schultz. 1974. Studies on the therapeutic and immunologic aspects of generalized demodectic mange in the dog. *J Am Anim Hosp Assoc* 10:233-244.
  - Scott, D.W., R.D. Schultz and E. Baker. 1976. Further studies on the therapeutic and immunologic aspects of generalized demodectic mange in the dog. *J Am Anim Hosp Assoc* 12:203-213.
  - Scott D.W. and D.K. Walton. 1985. Experiences with the use of Amitraz and Ivermectin for the treatment of generalized Demodicosis in dogs. *JAAHA* 21:535-541.
  - Six RH, et al. Efficacy of sarolaner, a novel oral isoxazoline, against two common mite infestations in dogs: *Demodex* spp. and *Otodectes cynotis*. *Vet Parasitol.* 222:62-6. 2016.

#### ❖ **Feline Demodicosis**

- **Species**
  - *Demodex cati* - (*Demodex folliculorum* var. *cati*); Feline demodectic mange mite
  - *Demodex gatoi* - a short stubby form
  - Also an unnamed species similar to *D. criceti* in hamsters
- **Hosts and Geographic Distribution**
  - **Cats; Worldwide**
- **Demodicosis is not common in cats**
  - Smaller, but morphologically similar to *D. canis*. Eggs are slim rather than oval; immature stages narrower than *D. canis*.
  - Transmission between cats and dogs unknown; as in dogs, *D. cati* not considered contagious.
  - Three varieties, one long form (*D. cati*) in hair follicles and two short forms (*D. gatoi*) and another short form (unnamed) in stratum corneum.
  - Short forms may be contagious & cats may have underlying disease; Several unrelated cats in a household may have *D. gatoi* infestations with clinical signs.
- **Pathogenesis**
  - *Demodex cati*- Probably due to endogenous or exogenous immunosuppression. Occasionally reported in association with FeLv and diabetes. Not considered a hereditary disease.
  - *Demodex gatoi* is now described in all its life stages from the domestic cat. Unlike *D. cati*, which inhabits the hair follicles, *D. gatoi* resides on the epidermal surface.
- **Clinical Signs**
  - Localized alopecia with predilection for the face; external ear canals, bridge of the nose, eyelids, periocular skin.
  - Circumscribed macules and patches of alopecia, scaling, erythema, pruritus and crusting
  - Younger cats usually affected, most common in purebred Siamese & Burmese
- **Diagnosis**
  - Clinical signs
  - Scrape and demonstrate mites
- **Treatment**
  - 1.5 to 2.5% Lime sulfur bath every 7-10 days usually curative in 4 to 6 weeks
  - Two recent publications showing fluralaner was effective against *D. cati* and *D. gatoi*.
  - There is a publication showing that topical moxidectin-imidacloprid applied weekly cleared *Demodex gatoi* from a household of cats.
  - \* No approved treatments
- **Selected References:**
  - Chalmers, S., R.O. Schick and J. Jeffers. 1989. Demodicosis in two cats seropositive for feline immunodeficiency virus. *JAVMA* 194;2:256-257.
  - Duangkaew L1, Hoffman H2. Efficacy of oral fluralaner for the treatment of *Demodex gatoi* in two shelter cats. *Vet Dermatol.* 2018 Jan 31

- Ghubash R. Parasitic miticidal therapy. Clin Tech Small Anim Pract. 2006 21(3):135-44
- McDougal, B.J. and C.P. Novak. 1986. Feline demodicosis caused by an unnamed Demodex mite. Comp. Cont. Ed. 8:820-822.
- Matricoti I, Maina E. The use of oral fluralaner for the treatment of feline generalized demodicosis: a case report. J Small Anim Pract. 2017 Aug;58(8):476-479.

❖ **Cheyletiellosis - "Walking dandruff"**

- **Species**
  - *Cheyletiella yasquri* - (dogs), *blakei* - (cats), *C. parasitivorax* - (rabbit & cats)
- **Host, Morphology and Geographic Distribution**
  - Dogs, Cats, Humans
  - Widespread
  - 300-500 µm long (Large Mites)
  - Large protruding hook-like mouth parts (palpal claws)
  - Long, tapering legs extending beyond the body
  - Eggs 110 x 230 µm (3-4 times as large as hookworm eggs)
- **Life Cycle**
  - Spend entire life (egg - larva - nymph - adult) on host; live in keratin layer of the epidermis.
  - Transfer by direct contact
  - Larvae and nymphs die in about 24 hours away from the host.
  - Adults may survive about 10 days.
- **Predisposition**
  - Young animals predisposed; Kennels, Pet Stores, etc.
  - A big problem in puppy brokerage houses.
- **Pathology**
  - Burrow very superficially in skin; "pseudo-tunnels"
  - Produce an exfoliative response
  - Attach to skin at a specific angle and become engorged with a colorless fluid
- **Clinical Signs – Dogs – usually a puppy disease**
  - Rapid onset seborrhea with or without pruritus
  - Fine to coarse scaling & crusting, on dorsum, scapular area, lumbar area, neck, top of head
  - Asymptomatic carriers (Both dogs and cats)
  - Pet owner may be pruritic
- **Clinical Signs - Cats**
  - More often asymptomatic than dogs
  - Variable pruritus
  - Onset tends to be insidious
  - Gradual increase in miliary lesions or generalized dandruff
  - Erythematous papules on head, neck and back
  - Pet owner may be pruritic
- **Diagnosis**
  - Recent group contacts (dog & cat shows, etc.): Recently acquired from kennel, etc.
  - Dermatologic lesions on people living in household
  - "Clear tape preparation" - Part hairs on cat, use tape to pick up debris, mites, etc. Tape acts as coverslip. Use mineral oil as mounting medium.
  - Butcher paper method (Groom vigorously) – brush mites onto brown paper
  - KOH digest - comb vigorously place hair and debris in 10% KOH over night or heat gently for 15 minutes, centrifuge & examine sediment
  - Superficial skin scraping. No. 10 scalpel blade dipped in mineral oil
  - Fecal flotation (especially cats)

- **Treatment - No approved treatments**
  - Dogs:
    - Permethrin-Dinotefuran-Pyriproxyfen topical spot-on combination (Vectra® 3D) is approved for the elimination of Cheyletiella on dogs. Only approved treatment.
    - Selamectin 6-12mg/kg topically on days 0,15 & 30
    - Ivermectin administered at 300 µg/kg SQ or orally; treat at 14-day intervals for 3 to 6 weeks (has been used in both dogs and cats; **do not use in Collies and other sensitive breeds without testing**).
    - Fipronil spray; reports of successful treatment
    - Dips
    - Lime/Sulfur, permethrin, amitraz dips- at 2-week intervals for 4 to 8 weeks.
  - Cats:
    - Selamectin 6-12mg/kg days 0,15 & 30
    - Ivermectin administered at 300 mg/kg SQ or orally; treat at 14-day intervals for 3 to 6 weeks.
    - Fipronil spray; reports of successful treatment
    - Dips: Carbaryl, Lime/Sulfur -Insecticidal dip or shampoo
  - Rabbits:
    - Selamectin 6 – 12mg/kg days 0, 15 & 30
  - Treat all animals highly contagious - so treat **all** contact animals
- **Selected references**
  - Chailleux N, Paradis M: Efficacy of selamectin in the treatment of naturally acquired cheyletiellosis in cats. *Can Vet J* 43:767–770, 2002.
  - Curtis CF. Current trends in the treatment of Sarcoptes, Cheyletiella and Otodectes mite infestations in dogs and cats. *Vet Dermatol* 2004 Apr;15(2):108-14.
  - Foley, R.H. 1991. Parasitic mites of dogs and cats. *Comp Cont Ed Pract Vet* 13:793-801.
  - Grant, D.I. 1991. Miliary dermatitis in the cat. *J Sm Anim Pract* 32:387-393.
  - Kwochka KW. Mites and Related Disease. In: the Veterinary clinics of North America, Small animal Practice, ed by RP Grieve. Philadelphia, WB. Saunders 17:1263-1284, 1987.
  - Ghubash R. Parasitic miticidal therapy. *Clin Tech Small Anim Pract* 2006 21(3):135-44
  - Merchant, S.R. 1990. Zoonotic Diseases with Cutaneous manifestations - Part I. *The Compendium* 12:371-378.
  - Page N, de Jaham C, Paradis M. Observations on topical ivermectin in the treatment of otoacariasis, cheyletiellosis, and toxocarosis in cats. *Can Vet J.* 2000 41(10):773-6.
  - Paradis, M. and A. Villeneuve. 1988. Efficacy of ivermectin against Cheyletiella yasquri infestation in dogs. *Canadian Vet J* 29:633-635.
  - Paradis, M., D. Scott and A. Villeneuve. 1990. Efficacy of ivermectin against Cheyletiella blakei infestation in cats. *J Am Anim Hosp Assoc* 26:125-128.
  - Wagner R, Stallmeister N. Cheyletiella dermatitis in humans, dogs and cats. *Br J Dermatol.* 2000 143(5):1110-2.