



# PARASITOLOGY

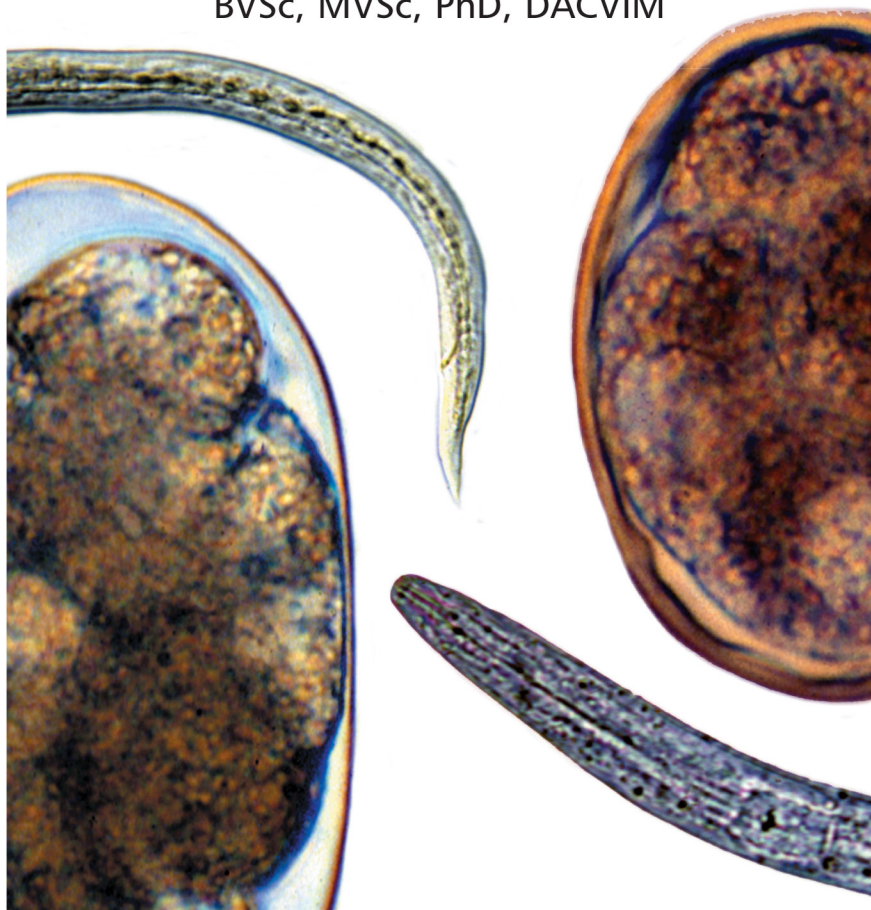
DIAGNOSIS AND TREATMENT OF COMMON PARASITISMS IN

DOGS AND CATS

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# **PREFACE**

The purpose of this set of Flash Cards is to provide a quick guide to the most common parasites seen in dogs and cats, the diseases they produce, and treatments to remove the infections. Parasitologists tend to make keys for other parasitologists who share a familiarity with the systematic format in which parasites are classified. In this publication, we have collected all of the essential information about a particular parasite on a single review card for quick reference. The material is organized so that information regarding the organism, its diagnostic stage, the type of specimen required, location in the body, and methods of control can be easily reviewed. Only those few points of biology with a direct bearing on control are presented. Similarly, attention is only drawn to zoonoses of major potential significance. No attempt is made to be all-inclusive with respect to either pathogens that may be encountered or to treatments that may be applied.

This information is also available as a PDA program. The plan from the outset was to develop a set of information that could be comfortably presented on a small screen. It is our belief that the hand-held device will also serve as an electronic visual key to these parasites. We think that the different search capabilities of the PDA format will be a favorable attribute for the individual who needs rapid access to diagnostic and treatment information in a clinical or laboratory setting. We hope that the information we have provided in both of these formats is what people really do need for effective management of the commonly encountered parasitisms of dogs and cats.

The material evolved from a joint interest between the authors and our editor, Carroll Cann, in developing a resource that would work in a pocket computer format. It has been a pleasure working with Carroll, and a lot fun bringing the initial idea to fruition. We have spent a good deal of time with the team at Teton NewMedia developing various aspects of the design and presentation. Thus, we also need to thank Cynthia Roantree, Nicol Giandomenico, Susan Hunsberger, Anita Sykes and Sue Haun for making this an enjoyable and productive experience.



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## ALARIA CANIS

Larger intestinal fluke acquired by eating amphibian or mammalian hosts.

**PPP=** 3 weeks.

**Dx:** Eggs in feces are large (110 to 130  $\mu\text{m}$  long) and brown with contained cells of embryo (will often appear clear on sugar flotation).

**Adult Habitat:** Small intestine.

**Similar Species:** There are a number of species of *Alaria* that infect dogs.

**Range:** Species around the world.

**Clinical Signs:**

Asymptomatic.

**Tx:** No approved drug. Praziquantel efficacious, also probably epsiprantel.

Drontal® Plus

Tablets (not for puppies <3 weeks or 2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine

Cestocide Tablets (not for use in puppies <4 weeks)

Droncit® Injectable

Cestocide for Dogs and Cats





## ANCYLOSTOMA BRAZILIENSIS

Canine/feline hookworm common along southern Atlantic seacoast and Caribbean. Transcutaneous infection and ingestion of paratenic hosts.

**PPP=** 2 weeks.

**Dx:** Elongate, ellipsoid ( $60\text{ }\mu\text{m}$  long), thin-shelled egg in feces (in the 8-celled stage) is indistinguishable from *Ancylostoma caninum*. *Ancylostoma* eggs are smaller than *Uncinaria* eggs. If eggs develop and hatch in feces L1 ( $300\text{--}340\text{ }\mu\text{m}$ ), will have a short esophagus with a bulb at its base and a small genital primordium (compare with *Strongyloides*).

**Adult Habitat:** Small intestine.

**Similar Species:** *Ancylostoma caninum*.

**Range:** Southern Atlantic seacoast and Caribbean.

**Clinical Signs:** Anemia, but *Ancylostoma braziliensis* causes less blood loss than *Ancylostoma caninum*, so less likely to cause acute disease.

**Potential Zoonosis:** Cutaneous larva migrans in the southeastern United States and Caribbean islands.

**Tx:** Hookworms constantly repopulate the intestine from larvae sequestered in tissues, so it is possible that fecal samples collected 2 weeks after treatment will show additional eggs. Drugs to clear the adult infections at the labeled dose include:

Nemex<sup>TM</sup>

Panacur<sup>®</sup> Granules 22.2%

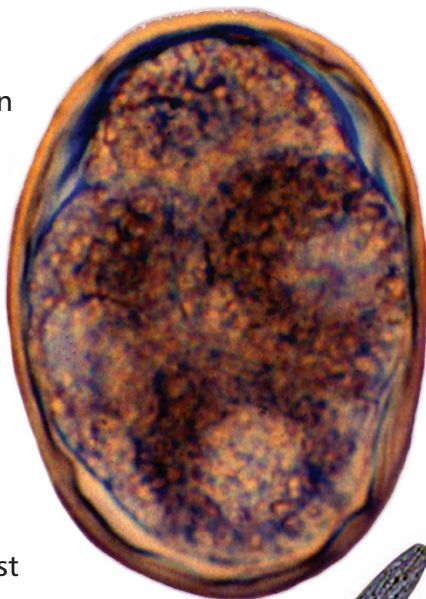
Drontal<sup>®</sup> Plus (not for puppies <3 weeks or 2 lbs)

Heartgard<sup>®</sup> Plus (not for puppies <6 weeks)

Interceptor<sup>®</sup> (not for puppies or <6 weeks or 2 lbs)

Sentinel<sup>TM</sup> (not for puppies or <4 weeks or 2 lbs)

Sentinel<sup>TM</sup> Flavor Tabs<sup>®</sup> (not for puppies <4 weeks or 11 lbs)





## ANCYLOSTOMA CANINUM

Common canine hookworm (most pathogenic). Transcutaneous and transmammmary infection

**PPP=** Puppies can shed eggs as early as 2 weeks after birth (transmammmary infection).

**Dx:** Elongate ellipsoid (60  $\mu$ m long), thin-shelled egg in feces (in the 8-celled stage) is indistinguishable from *Ancylostoma braziliensis*.

*Ancylostoma* eggs are smaller than *Uncinaria* eggs. If eggs develop and hatch in feces L1 (300-340 $\mu$ m), will have a short esophagus with a bulb at its base and a small genital primordium (compare with *Strongyloides*). Found in feces.

**Adult Habitat:** Small intestine.

**Similar Species:** *Ancylostoma braziliensis*.

**Range:** World.

**Clinical Signs:** Anemia. Puppies can die several weeks after birth from transmammmary acquired disease. May see diarrhea, constipation, or blood in the stool.

**Tx:** Give anemic puppies transfusions immediately, then treat adult worms. Hookworms constantly repopulate the intestine from larvae sequestered in tissues, so possible that fecal samples collected 2 weeks after treatment will show additional eggs. This repopulation of the intestine can go on for months to years. Drugs to clear the adult infections at the labeled dose include:

Nemex™

Panacur® Granules 22.2%

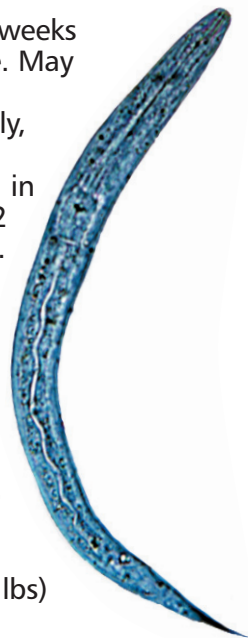
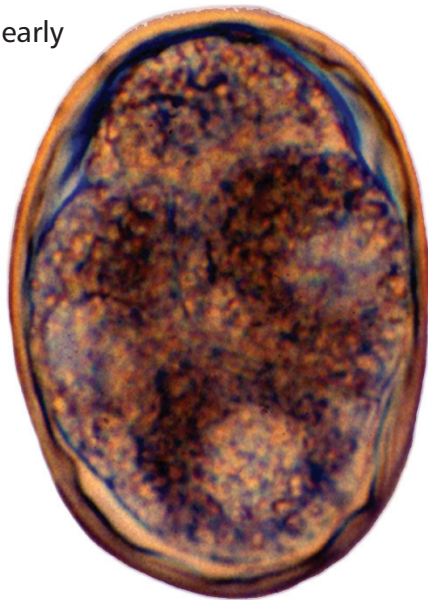
Drontal® Plus (not for puppies <3 weeks or 2 lbs)

Heartgard® Plus (not for puppies <6 weeks)

Interceptor® (not for puppies or <6 weeks or 2 lbs)

Sentinel™ (not for puppies or <4 weeks or 2 lbs)

Sentinel™ Flavor Tabs® (not for puppies <4 weeks or 11 lbs)







## **BABESIA CANIS**

Large *Babesia* organism in dog RBCs transmitted by tick bite.

**PPP**= 1 to 3 weeks.

**Dx:** Trophozoites and gametocytes in RBCs.

**Habitat:** RBCs.

**Similar Species:** *Babesia gibsoni* has stages in RBCs that are smaller.

**Range:** World.

**Clinical Signs:** In United States, often asymptomatic (Greyhounds). South African strains more pathogenic.

Acute presentation typical: fever, lethargy, acute anemia.

Peracute: hypertensive shock, hypoxia, vascular stasis is rare (puppies) and usually fatal.

Acute disease: hemolytic anemia, thrombocytopenia, lymphadenopathy, splenomegaly. May be complicated with concurrent rickettsial infections.

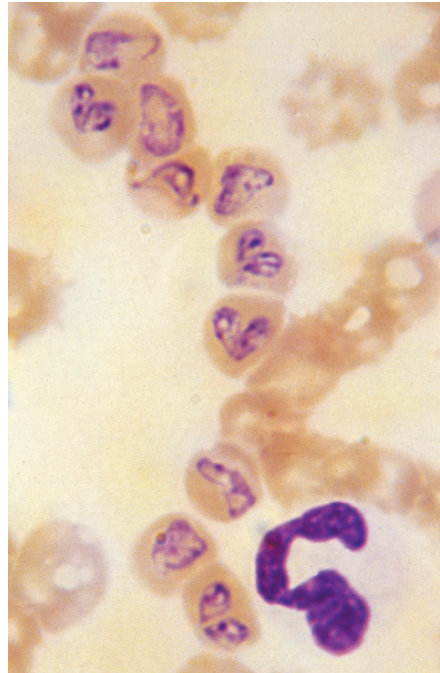
**Tx:** One approved product.

Imizol® (imidocarb dipropionate; 7.5 mg/kg, IM, once, or repeat in 2 weeks)

Berenil® (diaminazene aceturate; 3.5 mg/kg, IM, once. Note: not available in United States)

Phenamidine® (phenamidine isethionate; 15 mg/kg, SQ, q24h for 2 days. Note: not available in United States) 1% Trypan blue (10 mg/kg, IV, once).

**Supportive Care:** whole blood or packed RBC transfusion, treat for shock (fluids).





## **BABESIA GIBSONI**

Small *Babesia* organism in dog RBCs transmitted by tick bite.

**PPP=** 1 to 3 weeks.

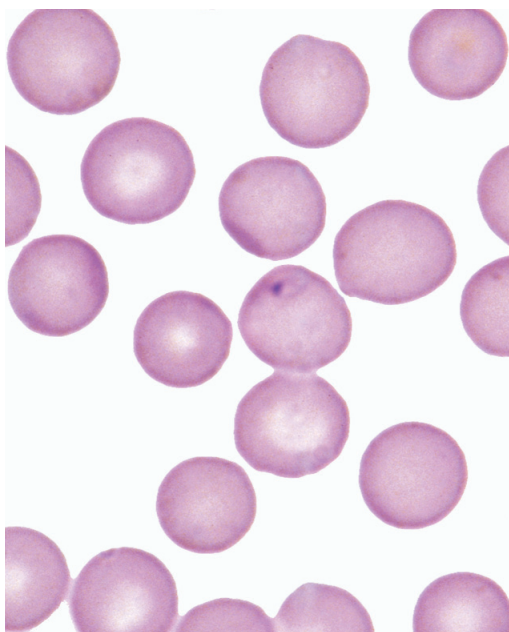
**Dx:** Trophozoites and gametocytes in RBCs.

**Habitat:** RBCs.

**Similar Species:** *Babesia canis* has stages in RBCs that are larger.

**Range:** World. United States – southwest. Found in Bull terrier breed.

**Clinical Signs:** More pathogenic than *B. canis*. Acute presentation typical: fever, lethargy, acute anemia. Peracute: hypertensive shock, hypoxia, vascular stasis is rare (puppies) and usually fatal. Acute disease: hemolytic anemia, thrombocytopenia, lymphadenopathy, splenomegaly. May be complicated with concurrent rickettsial infections.



**Tx:** One approved product.

Imizol® (imidocarb dipropionate; 7.5 mg/kg, IM, once, or repeat in 2 weeks)

Berenil® (diaminazene aceturate; 3.5 mg/kg, IM, once.  
Note: not available in United States)

Phenamidine® (phenamidine isethionate; 15 mg/kg, SQ, q24h for 2 days. Note: not available in United States) 1% Trypan blue (10 mg/kg, IV, once. Unknown efficacy against *B. gibsoni*)

**Supportive Care:** whole blood or packed RBC transfusion. Treat for shock (fluids).





## BALLATIDIUM COLI

Large ciliate trophozoites and cysts in feces of dogs acquired by ingestion of infectious cyst.

**PPP=** 2 weeks.

**Dx:** Trophozoites and cysts in feces. Ciliated trophozoites large (up to 150  $\mu\text{m}$  long) and ovoid, cytostome at narrower end, with two nuclei (one large and bean shaped, other small and spherical).

Cysts spherical, 40 to 60  $\mu\text{m}$  wide, with a relatively clear thin shell. Just under the shell can be seen striations that represent cilia on surface of contained trophozoite.

**Habitat:** Lumen of cecum and colon; can cause ulcerations.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Rare in dogs. When present, associated with watery diarrhea and intestinal ulcers. Has proved fatal.

**Potential Zoonosis:** Dogs probably infected from other mammals, however, routine precautions should be taken when handling canine fecal matter.

**Tx:** No approved drug.

Metronidazole, furazolidone and tetracyclines (less effective) have been used in man and are probably effective in dogs:

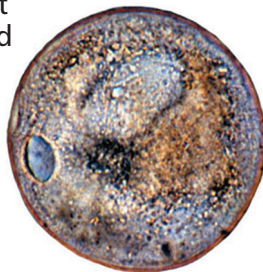
Flagyl<sup>®</sup> oral tablets

(metronidazole: 25 mg/kg, PO, q12h for 5 days)

Vibramycin<sup>®</sup> capsules, tablets, oral syrup or suspension, or Ronaxan<sup>®</sup> tablets (doxycycline: 5 mg/kg, PO, q12h for 21 days)

Terramycin<sup>®</sup> capsules (oxytetracycline: 22 mg/kg, PO, q8h for 14 days).

Furoxone<sup>®</sup> tablets or oral liquid (furazolidone: 5 mg/kg, PO, q12h, 1 week).





## BAYLISASCARIS PROCYONIS

Raccoon roundworm – dogs occasionally infected with adults. Very common in raccoons, also in kinkajous.

**PPP=** 2 months.

**Dx:** Egg in feces slightly smaller in diameter, ellipsoid, (70  $\mu$ m long) than *Toxocara* and *Toxascaris*, dark in color, with an externally roughened eggshell (not dimpled).

**Adult Habitat:** Small intestine.

**Similar Species:** Other species of *Baylisascaris* occur in skunks and bears.

**Range:** Throughout North and Central America. Worms taken to Europe via imported raccoons.

**Clinical Signs:** None when infected with adult worms.

**Potential Zoonosis:** Visceral and ocular larva migrans, associated with severe neurologic disease and death.

**Tx:** No approved drugs but typical ascarid drugs are successful. Large range of products used as per label instructions:

Nemex™

Panacur® Granules 22.2%

Drontal® Plus (not for puppies <3 weeks or 2 lbs)

Heartgard® Plus (not for puppies <6 weeks)

Interceptor® (not for puppies <6 weeks or 2 lbs)

Sentinel™ (not for puppies <4 weeks or 2 lbs)

Sentinel™ Flavor Tabs® (not for puppies <4 weeks or 11 lbs)





## CHEYLETIELLA YASGURI

Hair-clasping mite of dogs acquired by direct contact.

**Dx:** Mites in skin scrapings or fecal examinations. Mites (500 to 600  $\mu\text{m}$  long) have 8 legs and formidable palpal claws on the anterior end that are diagnostic. Eggs are large and glued to hairs. In feces, eggs have projections on one end (remnant of glue).

**Adult Habitat:** Hair.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** None or mild dermatitis. Mites found in skin scrapings and fecal examinations of normal dogs.

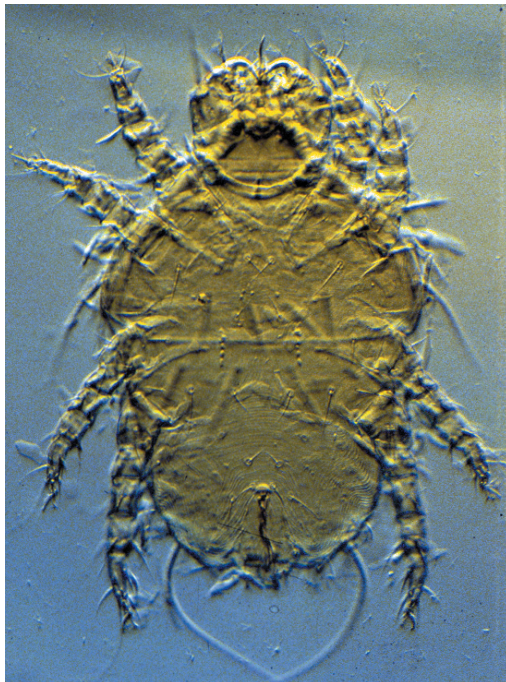
**Potential Zoonosis:** People handling dogs with cheyletiellosis have developed transient lesions.

**Tx:** Can be treated with pyrethrin or permethrin dips, mists, or sprays.

Defend® Exspot®

Insecticide for dogs (permethrin)

Frontline® Top Spot® for dogs and puppies (fipronil)





## CRENOSOMA VULPIS

Fox lungworm of dogs found in terminal bronchioli. Dogs infected by ingesting infected snails/slugs. Natural hosts: foxes and raccoons.

**PPP**= 3 weeks.

**Dx:** Larva (275  $\mu$ m long) passed in feces or transtracheal wash. Larva: long esophagus (1/2 body length) with pointed tail. Larva appears C-shaped with a pointed head compared to larvae of *Filaroides*.

**Adult Habitat:** Lumen of the trachea, bronchi, and bronchioles.

**Similar Species:** The five nematode larvae that can be found in dog feces include: *Strongyloides stercoralis*, *Filaroides osleri*, *Filaroides hirthi*, *Crenosoma vulpis*, and hatched *Ancylostoma* larvae.

**Range:** World.

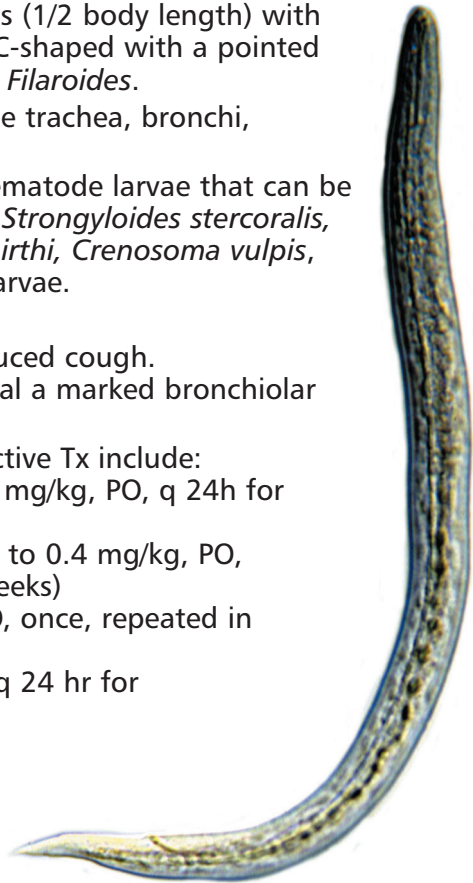
**Clinical Signs:** Exercise-induced cough. Chest radiographs may reveal a marked bronchiolar interstitial pattern.

**Tx:** No approved drug. Effective Tx include: Panacur® (fenbendazole: 50 mg/kg, PO, q 24h for 3 to 7 days)

Ivomec® (ivermectin: 0.2 to 0.4 mg/kg, PO, once, repeated in 2 weeks)

Levamisole (8 mg/kg, PO, once, repeated in 2 weeks)

Prednisone (0.5 mg/kg, q 24 hr for 5 days).







## CRYPTOSPORIDIUM PARVUM

Tiny coccidian acquired by ingestion of an oocyst. Infectious when passed.

**PPP=** 5 to 7 days.

**Dx:** Oocysts in feces, spheroid, easiest to see in sugar flotation (5  $\mu\text{m}$  in diameter).

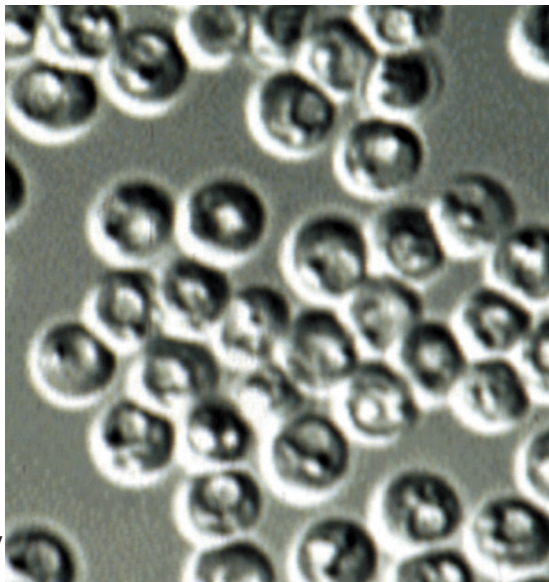
**Habitat:** Small intestinal mucosa.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Usually asymptomatic. Dogs with some other immunosuppressive disorder can develop severe diarrhea.

**Potential Zoonosis:** Unclear how many humans infected with canine genotype, but must, treat oocysts in dog feces as potentially infectious to people.



**Tx:** No approved drug. Paromomycin effective but use with care in young and dogs with severe diarrhea. Tylosin reported effective in one cat.

Humatin<sup>®</sup> (paromomycin: 125 –165 mg/kg, PO, q12h for 5 days). NOTE: if GIT inflamed, drug may be absorbed into blood and cause aminoglycoside nephropathy.

Tylan<sup>®</sup> soluble powder (100 gm containers; ~3g/teaspoon).

Dose for cat: 11 mg/kg, PO, q12h for 4 weeks.



## CTENOCEPHALIDES FELIS

Common cat and dog flea.

**Dx:** Adult, 1 to 3 mm, dark brown to black with combs (lines of thick bristles) on cheek and neck, laterally compressed, six legs.

**Habitat:** Haircoat. Eggs and larvae mainly in bedding. Vector of *Dipylidium caninum* – flea infected as larva.

**Similar Species:** *Trichodectes canis* (dogs). *Felicola subrostratus* (cats)

**Range:** Worldwide.

**Clinical Signs:** Usually none, many can cause anemia.

**Potential Zoonosis:** Feces may transmit cat scratch fever.

**Tx:** Removal followed by bathing. Very heavy infections may require transfusions.

### Oral

Capstar® (Nitenpyram)

Program® Flavor Tabs®  
(Lufenuron)

Sentinel® Flavor Tabs®  
(Lufenuron and  
Milbemycin oxime)

### Spot Ons

K9 Advantix™ (imidacloprid  
and permethrin) DO NOT USE ON CATS.

Advantage (Imidacloprid)

Adams™ spot-on Flea and Tick Control for Dogs (permethrin)

Frontline® Top Spot® for dogs and puppies (Fipronil)

Revolution (Selamectin)

Scratchex® 30 Day Flea and Tick Treatment (Permethrin)

Vet-Kem® Ovitrol Plus® Spot On® Flea and Tick Control for dogs and puppies (Permethrin and (S)-Methoprene)

### Collars

Adams™ Dual Action Flea and Tick Collar for dogs

(O-Isopropoxyphenyl methylcarbamate, 3-Phenoxybenzyl d-cis  
and trans 2,2,- dimethyl-3-(2-methylpropenyl)  
cyclopropanecarboxylate, N-Octyl bicycloheptene diacboximide)

Bansect® Flea and Tick Collars for dogs (Naled)

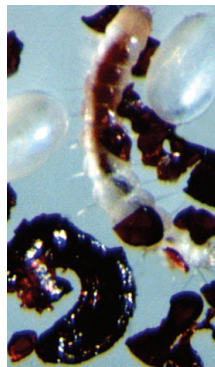
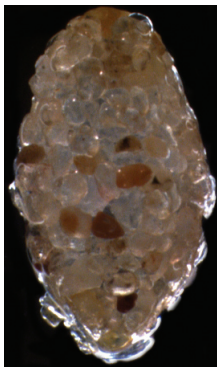
Happy Jack® Novation™ Flea and Tick Collar for dogs  
(Deltamethrin)

Hartz® 2 in 1® Flea and Tick Collar for dogs and puppies  
(Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for dogs (Tetrachlorvinphos)

Preventef® Flea and Tick Collar for Dogs (Diazinon)

Scratchex® Flea and Tick Collars for dogs (Chlorpyrifos)





## DEMODEX CANIS

Follicular mite of dogs acquired by direct contact.

**Dx:** Mites in skin scraping or fecal examinations. Both mites and eggs elongate. Mites are 200 to 300  $\mu\text{m}$  long and have a characteristic elongate shape with very reduced legs on the anterior end. Eggs are elongate and 150  $\mu\text{m}$  long.

**Habitat:** Hair follicles.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Often none.

Mites found in skin scrapings and fecal examinations of normal dogs. Can have discrete focal areas of alopecia or generalized hair loss, folliculitis, and secondary bacterial infections.

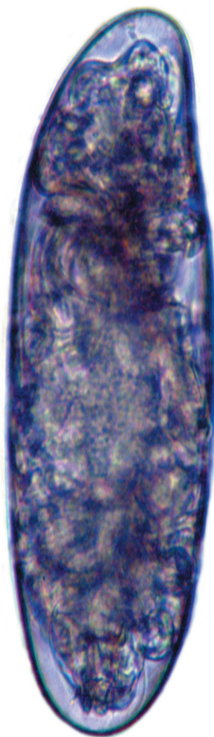
**Potential Zoonosis:** People handling dogs with demodectic mange have developed transient lesions.

**Tx:** Mitaban® only approved drug. Often avermectins at increased dosages are used especially in heritably-predisposed dogs.

Mitaban® (at labeled doses)

Interceptor® (2 mg/kg daily until condition clears). Not for puppies <2lbs or <6 weeks of age.

Ivomec® (ivermectin: 0.3 to 0.6 mg/kg, daily until condition clears – could take years).







## DERMACENTOR VARIABILIS

American dog tick. Attach to skin from brush or scrub.

**Dx:** Usually find adults, 3 to 15 mm, flat to bean shaped when engorged. Scutum is ornamented with patterns of white on a dark background. Have eyes on edges of scutum. No preanal groove. Nymphs look like small females

**Habitat:** Skin.

**Similar Species:** *Rhipicephalus sanguineus*.  
*Ixodes scapularis*.

**Range:** Eastern US, western states have *Dermacentor andersoni*.

**Clinical Signs:** Usually none; many can cause anemia.

**Potential Zoonosis:** No direct transfer of pathogens without attachment. Vector of canine ehrlichias and Rocky Mountain Spotted Fever.

**Tx:** Removal – wash wound with alcohol.

### Spot Ons

Frontline® Top Spot® for dogs and puppies (Fipronil)

K9 Advantix™ (imidacloprid and permethrin) DO NOT USE ON CATS.

Adams™ spot-on Flea and Tick Control for Dogs (permethrin)

Scratchex® 30 Day Flea and Tick Treatment (Permethrin)

Vet-Kem® Ovitrol Plus® Spot On® Flea and Tick Control for dogs and puppies (Permethrin and (S)-Methoprene)

### Collars

Adams™ Delta Force™ Tick Collar for dogs (Deltamethrin)

Adams™ Dual Action Flea and Tick Collar for dogs (O-Isopropoxyphenyl methylcarbamate, 3-Phenoxybenzyl d-cis and trans 2,2,- dimethyl-3-(2-methylpropenyl) cyclopropanecarboxylate, N-Octyl bicycloheptene diacarbonylimide)

Bansect® Flea and Tick Collars for dogs (Naled)

Happy Jack® Novation™ Flea and Tick Collar for dogs (Deltamethrin)

Hartz® 2 in 1® Flea & Tick Collar for dogs and puppies

(Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for dogs (Tetrachlorvinphos)

Preventef® Flea and Tick Collar for Dogs (Diazinon)

Preventic® Collar for dogs (Amitraz)

Scratchex® Flea and Tick Collars for dogs (Chlorpyrifos)

Vet-Kem® Tickaway™ Tick Collar for dogs (Propoxur)





## DIPETALONEMA RECONDITUM

Canine tissue filarid. Transmitted by fleas.

**PPP=** 2 to 4 months.

**Dx:** Microfilariae in blood. Antigen tests for heartworm should remain negative in dogs that have circulating *Dipetalonema reconditum* microfilariae.

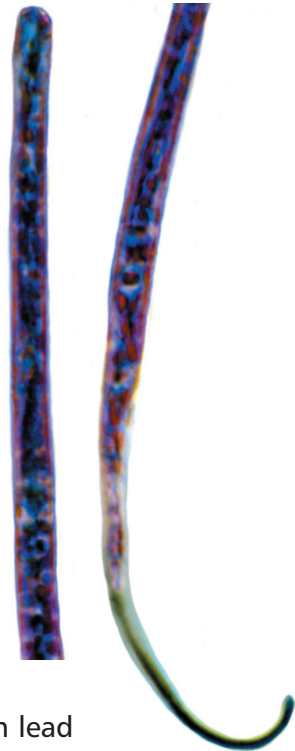
**Habitat:** Connective tissues of the body.

**Similar Species:** Microfilariae (275  $\mu$ m long) can be confused with those of *Dirofilaria immitis*. *Dipetalonema reconditum* microfilariae are thinner at midbody than RBCs and have a blunt head with a cephalic hook.

**Range:** World wherever dogs and mosquitoes are prevalent and temperatures are warm enough to support growth within the mosquito vector.

**Clinical Signs:** Asymptomatic.

**Tx:** None required. Important in that can lead to unnecessary arsenical treatment if misdiagnosed as heartworm.





## DIPHYLLOBOTHRUM LATUM

Canine broadfish tapeworm acquired by eating infected freshwater fish.

**PPP**= 5 or 6 weeks.

**Dx:** Egg (60  $\mu$ m long) in feces is brown, elongate, with a small operculum (or cap) on one end, containing cells of the developing larva.

Egg about the size of the egg of *Ancylostoma caninum*.

**Adult Habitat:** Small intestine.

**Similar Species:** Related exotic species around the world capable of infecting dogs. Egg very similar to that of *Spirometra* spp.

**Range:** Northern freshwater lakes.

**Clinical Signs:**

Asymptomatic.

**Tx:** No approved drug.

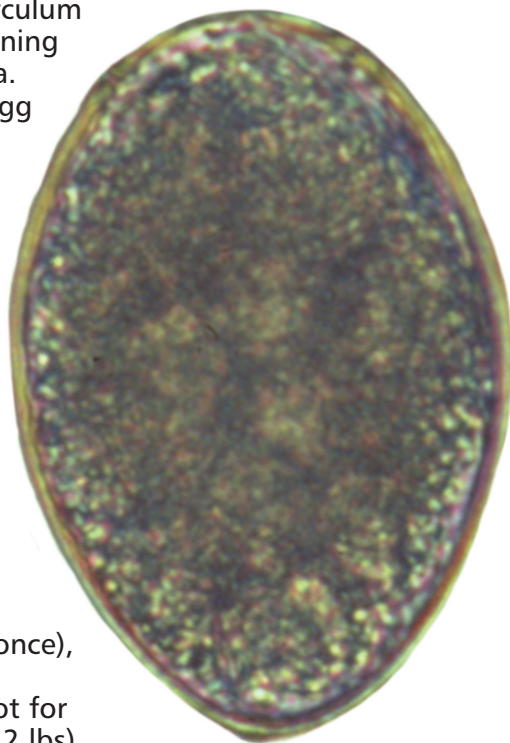
Praziquantel reported successful (7.5 mg/kg, PO, once), may work at labeled dose.

Drontal® Plus Tablets (not for puppies <3 weeks or 2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats





## DIPYLIDIUM CANINUM

Canine (feline) flea tapeworm acquired by eating an infected flea.  
**PPP=** 3 weeks.

**Dx:** Tapeworm segments (250 to 1000  $\mu$ m long) or egg balls (2 to 30 eggs/ball) found in feces.

Segments: recognized by paired lateral reproductive openings, containing egg balls. Egg balls: vary in size from a *Toxocara* egg (if only contains a few) to two or three times the diameter of a *Toxocara* egg (if contains around 30 eggs).

**Adult Habitat:** Small intestine.

**Similar Species:** Other tapeworm segments found in dog feces: *Taenia pisiformis* (reproductive pores on only one side), and *Spirometra*, *Diphyllobothrium*, and *Mesocestoides* (all have medial pores).

**Range:** World.

**Clinical Signs:** Asymptomatic. Very young flea-infested puppies can occasionally die of intestinal blockage due to large numbers of worms.

**Potential Zoonosis:** Occasionally infection (as in dogs) occurs in children who ingest an infected flea. Usually asymptomatic, but motile segments may appear in diapers.

**Tx:** Approved drugs for *Dipylidium caninum* are formulated with either praziquantel or epsiprantel and are very efficacious as labeled (Benzimidazoles, e.g., Panacur® does not clear *Dipylidium* infections):

Drontal® Plus Tablets (not for puppies <3 weeks or 2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats







## DIROFILARIA IMMITIS

Dog heartworm. Transmitted by mosquitoes.

**PPP**= 7 months.

**Dx:** Microfilariae in blood or by antigen detection test. Antigen tests on rare occasions negative in dogs with adult worms and high microfilarial counts, but usually correspond very well to tests for microfilariae.

**Habitat:** Pulmonary arteries and right heart.

**Similar Species:** Microfilariae (300  $\mu$ m long) can be confused with those of *Dipetalonema reconditum*. *Dirofilaria immitis* microfilariae are wider at midbody than RBCs and the head tapers gradually to tip.

**Range:** World, wherever dogs and mosquitoes are prevalent and temperatures are warm enough to support growth within the mosquito vector.

**Clinical Signs:** Usually respiratory signs of cough, tachypnea, exercise intolerance, syncope, rarely hemoptysis. Usually divided into 3 classes: Class I—asymptomatic, no radiographic signs or anemia; Class II—cough, exercise intolerance, anemia (between 20 and 30%), radiographic signs pulmonary artery enlargement; Class III—cardiac cachexia, severe cough at rest, signs of right heart failure (ascites), severe radiographic signs RSHF, enlarged pulmonary arteries, lung infiltrates from thromboembolism and severe anemia (<20%).

**Potential Zoonosis:** Rare lung nodules in humans who have been infected by bite of mosquito.

**Tx:** Immiticide® (melarsomine dihydrochloride; Class I and II: 2.5 mg/kg, IM deep in lumbar muscle, q24h for 2 doses repeated 4 to 6 months later if antigen test still positive. Class III: stabilize heart failure first with aspirin, glucocorticoids, furosemide, use 2.5 mg/kg, IM deep in lumbar muscle, once, then in 1 month, give 2.5 mg/kg, IM deep in lumbar muscle, q24h for 2 doses).





## ECHINOCOCCUS GRANULOSUS

Very small tapeworm of dogs acquired by eating viscera from infected ruminants (sheep and moose).

**PPP**= 2 months.

**Dx:** Eggs (30 to 35  $\mu\text{m}$  long) in feces. If a purgative given (dangerous because eggs infectious to man), adult worms (2 mm) may be found in feces.

**Adult Habitat:** Small intestine.

**Similar Species:** Eggs of *Echinococcus* are indistinguishable from those of *Taenia*.

**Range:** Areas where sheep (California, Arizona, New Mexico, and Utah), moose, or elk are found.

**Clinical Signs:**  
Asymptomatic.

**Potential Zoonosis:** Cystic hydatid disease in humans ingesting the egg passed in dog feces; **the egg is infectious when passed.**

**Tx:** Drug of choice: Praziquantel (100% efficacious)  
Drontal® Plus Tablets (not for puppies <3 weeks or 2 lbs)  
Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)  
Droncit® Injectable Cestocide for Dogs and Cats





## ECHINOCOCCUS MULTILOCCULARIS

Very small tapeworm of dogs acquired by eating infected small rodents.

**PPP=** 3 weeks.

**Dx:** Eggs (30 to 35  $\mu\text{m}$  long) in feces. If a purgative given (dangerous because eggs infectious to man), adult worms (2 mm) may be found in feces.

**Adult Habitat:** Small intestine.

**Similar Species:** Eggs of *Echinococcus* are indistinguishable from those of *Taenia*.

**Range:** Rare in most of the United States. Found in Alaska, across Canada, and extending into the wild canid population in the central United States.

**Clinical Signs:** Asymptomatic.

**Potential Zoonosis:** Alveolar hydatid disease in humans who ingest the egg. **The egg is infectious when passed. Human disease is 100% fatal without treatment.**

**Tx:** Drug of choice is Praziquantel (100% efficacious). In areas where endemic in dog populations (Alaska, etc.), dogs should be treated every 3 weeks.

Drontal® Plus Tablets (not for puppies <3 weeks or 2)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats







## EUCOLEUS AEROPHILUS

Common respiratory capillarid of dogs. Life cycle direct or through earthworms.

**PPP=** 3 to 5 weeks.

**Dx:** Egg in feces is similar to *Trichuris vulpis*, but smaller (60  $\mu$ m long), with polar plugs often at some angle off the linear axis of the egg. Surface has a fine net-like ornamentation.

**Adult Habitat:** Mucosae of lungs and bronchi.

**Similar Species:** *Eucoleus boehmi* of the nasal sinuses.

**Range:** World.

**Clinical Signs:** Wheezing, coughing, lack of weight gain. Chronic dry, nonproductive cough. Radiographs: diffuse peribronchial and interstitial infiltrate.

**Tx:** No approved drug. After Tx, eggs may be passed in feces for several weeks after adults killed. Potential therapies include:

Panacur® (fenbendazole:  
50 mg/kg x 3 days) Extend treatment to a week or treat every other week for two months.

Ivomec® (ivermectin 1% injection formulation:  
0.2 mg/kg subcutaneously or PO, repeat in 2 weeks)





## EUCOLEUS BOEHMI

Capillarid of canine nasal sinuses. Life cycle direct or through earthworms paratenic hosts.

**PPP=** 1 month.

**Dx:** Egg in feces is similar to *Trichuris vulpis*, but smaller (60  $\mu$ m long) with polar plugs often at some angle off the linear axis, and with fine pits on the surface. Egg contains an elongate oval embryo, while *Eucoleus aerophilus* eggs are in the single-celled stage when passed.

**Adult Habitat:** Threaded through nasal mucosa.

**Similar Species:** *Eucoleus aerophilus* of the bronchial epithelium.

**Range:** World.

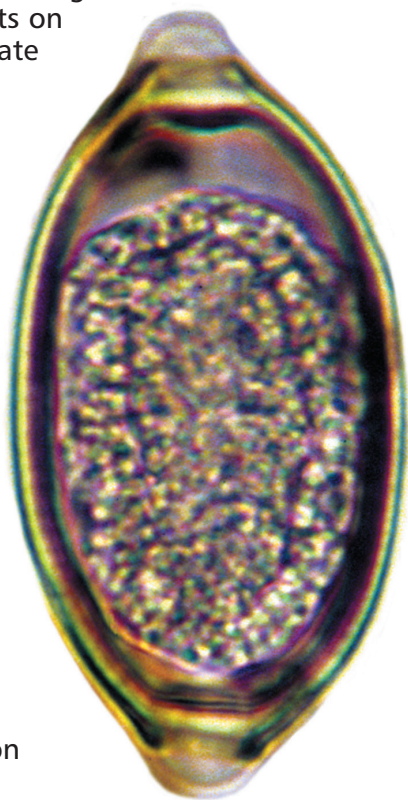
**Clinical Signs:** Asymptomatic, but may have rhinitis (serous nasal discharge, sneezing).

**Tx:** No approved drug. After Tx, eggs may be passed in feces for several weeks after adults killed.

Potential therapies include:

Panacur® (fenbendazole:  
50 mg/Kg x 3 days) Extend  
Tx to a week or treat every  
other week for 2 months.

Ivomec® (ivermectin 1% injection  
formulation: 0.2 mg/kg,  
subcutaneously or PO, repeat in  
2 weeks)





## FILAROIDES HIRTHI

Dog parenchymal lung parasite. Most common in collies and toy breeds. Larvae in the feces and saliva/vomit directly infectious.

**PPP**= 5 weeks.

**Dx:** Larvae (225  $\mu$ m long) in feces using zinc-sulfate flotation; long esophagus (1/2 body length) and straight tip to tail.

*F. osleri* has a kink just before tail tip. Chest radiographs: diffuse interstitial pattern.

### Adult Habitat:

Threaded through lung parenchyma.

### Similar Species:

The five nematode larvae that can be found in dog feces include: *Strongyloides stercoralis*, *Filaroides osleri*, *Filaroides hirthi*, *Crenosoma vulpis*, and hatched *Ancylostoma* larvae.



**Range:** World.

**Clinical Signs:** Very heavy infections: coughing, dyspnea, possibly diarrhea, dehydration. Light infections: asymptomatic.

**Tx:** No approved drug. Albendazole is the drug of choice, but the margin of safety is small and dogs should not be continued on this drug over the suggested 5 days.

Valbazen® Cattle Dewormer Suspension (albendazole:

11.36% suspension, 114 mg/ml): 25 mg/kg, PO, q12h for 5 days (side effects: bone marrow suppression).

Panacur® (fenbendazole: 50 mg/Kg, PO, q24h for 14 days, not curative in all cases)

Ivomec® (ivermectin 1% injection formulation: 0.05 mg/kg, SQ, once, then repeat 2 weeks later)



## **FILAROIDES OSLERI**

Dog nodular lung parasite. Larvae in the feces and saliva/vomit are directly infectious.

**PPP**= 6 months.

**Dx:** View nodules via bronchoscopy at bifurcation of trachea or L1, in vomit, feces, or transtracheal wash fluid. Larvae (250  $\mu$ m long) in feces using zinc-sulfate flotation; long esophagus (1/2 body length) and a distinctive kink before tail tip.

*F. hirthei* is straight tipped.

### **Adult Habitat:**

Nodules in the terminal trachea and bronchi.

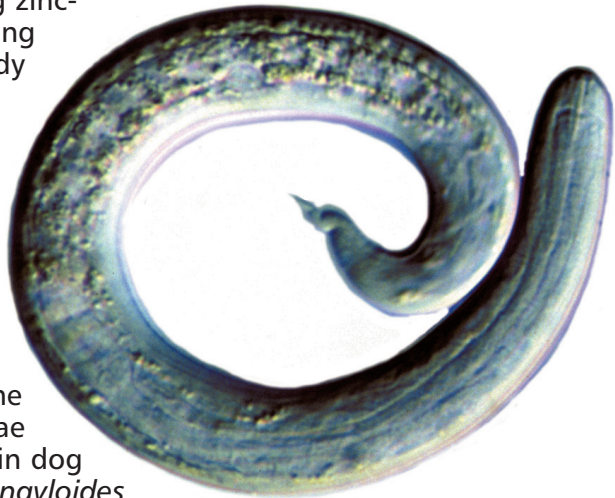
### **Similar Species:**

The five nematode larvae that can be found in dog feces include: *Strongyloides stercoralis*, *Filaroides osleri*, *Filaroides hirthei*, *Crenosoma vulpis*, and hatched *Ancylostoma* larvae.

**Range:** World.

**Clinical Signs:** Exercise-induced dry cough, dyspnea.

**Tx:** No approved drug. Remove nodules via bronchoscopy; oxfendazole (10 mg/kg, q24 hr for 28 days), prednisone (0.5 mg/kg, q 24 hr for 5 days post-nodule removal).







## GIARDIA CANIS

Flagellate trophozoites and cysts in feces of dogs acquired by ingestion of infectious cyst.

**PPP**= 5 to 7 days.

**Dx:** Trophozoites and cysts in feces.

Trophozoites more common in loose stools; tennis-racket or tear-drop shaped (10 to 17  $\mu\text{m}$  long). Two nuclei in the wider end, 8 trailing flagella, motile in saline preparations and have a gliding motion. Cysts most common in formed stools, ellipsoid, clear, contain 4 nuclei, (about 10  $\mu\text{m}$  long).

**Habitat:** Small intestinal mucosa (surface).

**Similar Species:** Trophozoites must be distinguished from *Pentatrichomonas*. Cysts can be confused with sporocysts of *Sarcocystis* and oocysts of coccidia.

**Range:** World.

**Clinical Signs:** Usually asymptomatic, but can show small bowel diarrhea, often with high fat content.

**Potential Zoonosis:** *Giardia canis* can be transmitted to humans, but humans typically acquire infections from other humans. Routine precautions should be taken when handling canine fecal matter.

**Tx:** No approved drug. Benzimidazoles used most commonly now. Fenbendazole (Panacur) works at dosage approved for helminth removal. Drontal and Albendazole have been used.

Panacur® Granules 22.2%

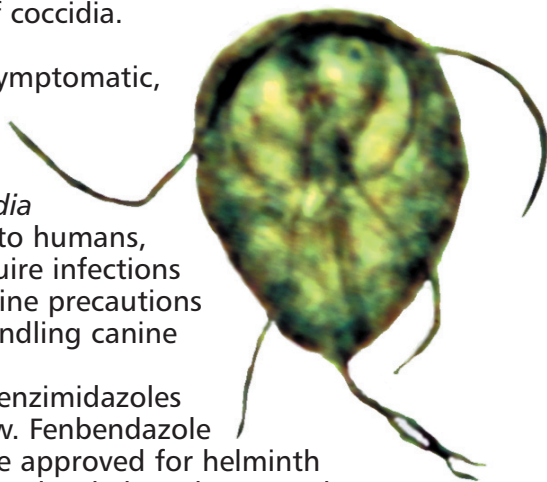
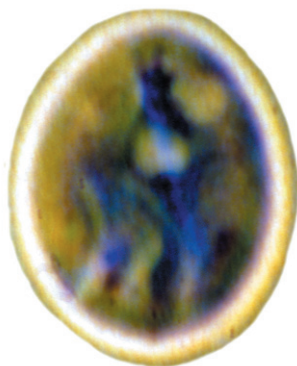
Drontal® Plus (Treat daily at labeled dose for 3 days).

Not for puppies <2 pounds or <3 weeks of age.

Valbazen® Cattle Dewormer Suspension (albendazole:11.36% suspension, 114 mg/ml. Dose: 25 mg/kg, BID for 2 or 3 days. Side effects: bone marrow suppression).

Flagyl® oral tablets (metronidazole: 25 mg/kg, PO, q12h for 5 days—67% efficacious).

Atabrine® oral tablets (quinacrine: 6.6 mg/kg, PO, q12h for 5 days—100% effective but 50% side effects of lethargy, fever).





## **HAMMONDIA HEYDORNI**

Small-sized canine coccidian acquired by eating infected rabbits, sheep, or other non-murine mammals. No direct infection of dogs with oocysts.

**PPP=** 7 to 8 days.

**Dx:** Oocysts in feces, clear, unsporulated, round to ovoid (10 to 13  $\mu\text{m}$  long).

**Habitat:** Small intestinal mucosa.

**Similar Species:** Oocyst indistinguishable from that of *Neospora caninum*

**Range:** World.

**Clinical Signs:** Asymptomatic.

**Tx:** No approved drug. Will probably respond to same treatments used for toxoplasmosis:

Antirobe® capsules or oral solution, or Cleocin® injectable solution (clindamycin: 10-20 mg/kg, PO, IM, q12h for 2 weeks).

Tribissen® tablets (sulfadiazine-trimethoprim: 15 mg/kg, PO, q12h for 14 days).





## HEPATOOZON AMERICANUM

*Hepatozoon* of American dogs, transmitted by eating infected ticks.

**PPP=** 1 to 3 weeks.

**Dx:** Gamonts in polymorphonuclear leukocytes or large schizonts reviewed in muscle biopsy. Dx based on typical clinical and radiographic findings, markedly elevated neutrophilia, and finding organism on Bx of tissue.

**Habitat:** PMNs, schizonts in skeletal muscle (very large cystic form).

**Similar Species:** *Hepatozoon canis* in other parts of the world typically causes a more chronic form of the disease with schizonts in multiple organs.

**Range:** World.

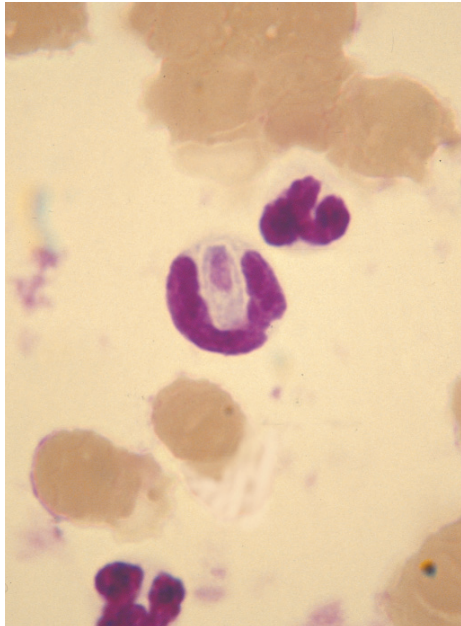
**Clinical Signs:** Emaciation and fever (unresponsive to antibiotics). Severe neutrophilic leukocytosis and anemia with significant joint pain, myositis, and periosteal bone proliferation (can be seen on radiographs), reluctance to move.

**Tx:** No single treatment effectively eliminates tissue stages, but trimethoprim-sulfadiazine, clindamycin, and pyrimethamine followed by long-term administration of decoquinatate results in extended survival times and excellent quality of life. Relapses occur within 3 to 4 months. Palliative use of nonsteroidal anti-inflammatory agents (aspirin, phenylbutazone, flunixin) relieve discomfort. Glucocorticoids give temporary improvement but, longterm, exacerbate the disease.

Tribissen® tablets (sulfadiazine-trimethoprim: 15 mg/kg, PO, q12h for 2 weeks).

Antirobe® capsules or oral solution (clindamycin: 10 mg/kg, PO, q8h for 2 weeks).

Daraprim® 25 mg oral tablets (pyrimethamine; 0.25 mg/kg, PO, q24h for 2 weeks).







## HETEROBILHARZIA AMERICANUM

Canine blood fluke acquired by cercariae penetrating the skin.

PPP= 2 months.

**Dx:** Eggs in feces relatively round, about 80  $\mu\text{m}$  in diameter, brown, and containing developed miracidium. Eggs collected in water will hatch.

Ultrasound may reveal fibrosis of the hepatic portal system.

### Adult Habitat:

Mesenteric veins and hepatic portal veins.

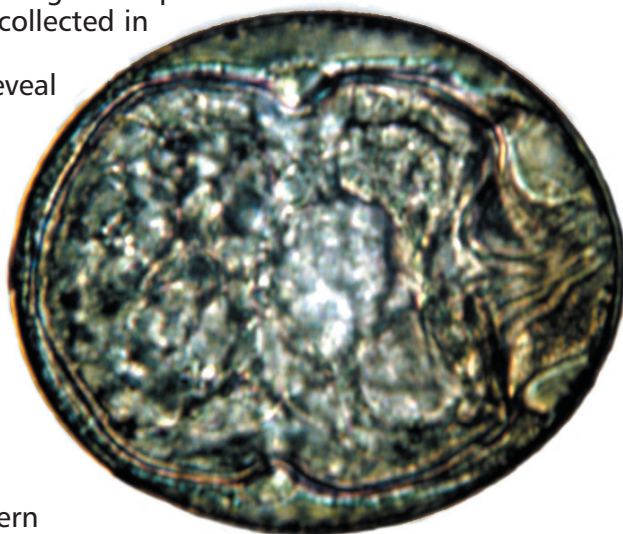
### Similar Species:

Dogs in SE Asia may be infected with *Schistosoma japonicum*.

**Range:** Southeastern United States

**Clinical Signs:** Diarrhea, fever, icterus, and anorexia. With liver cirrhosis, may have hypercalcemia, hyperglobulinemia, hypoalbuminemia, anemia, and eosinophilia.

**Tx:** No approved drug. Praziquantel at high doses effective: Droncit® Canine Cestocide Tablets (praziquantel; 40-50 mg/kg, PO, once, then repeated monthly, for several months until feces clear). Not for puppies <4 weeks.





## ISOSPORA CANIS

Large-sized canine coccidian acquired by eating sporulated oocyst or infected rodent.

**PPP=** 9 to 11 days.

**Dx:** Oocyst in feces, clear wall, ovoid, 40 x 30  $\mu$ m, containing single sporoblast when fresh.

**Habitat:** Distal third of small intestine.

**Similar Species:** Easy to differentiate from other canine coccidia by large oocyst.

**Range:** World.

**Clinical Signs:**

Diarrhea. May have blood in feces.

**Tx:** Once oocysts appear in feces, most of the damage from development in the mucosa has

already occurred. Sulfonamides are the drugs of choice:

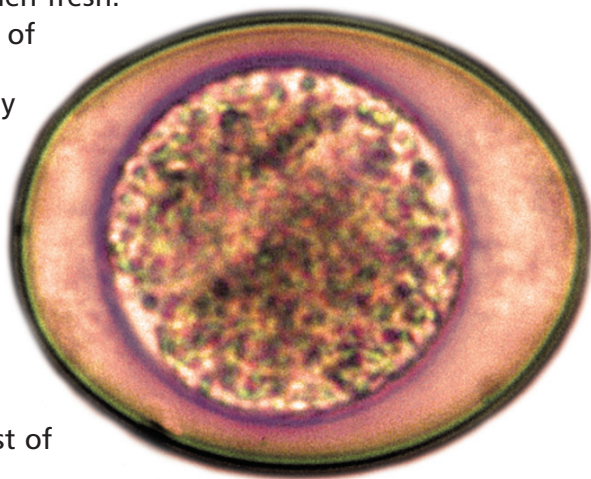
Tribissen® tablets (sulfadiazine-trimethoprim: 30 mg/kg, PO, q12h for 5 days)

Albon® (sulfadimethoxine: 50 mg/kg, PO, q24h for 1 to 3 weeks)

Primor® (sulfadimethoxine-ormetoprim: 66 mg/kg, PO, q24h for 1 to 3 weeks)

Corid® (amprolium: 1.25% oral crumbles, 9.6% solution, 20% soluble powder: 100 mg (pups < 10 kg) or 200 mg (pups > 10 kg) total dose, PO, q24h for 1 to 2 weeks.) If added to food (bitches and pups) 250 – 300 mg total dose, 20% powder on food up to 2 weeks. If added to water, 30 ml of 9.6% solution to 3.8 L (1 gallon) of water with no access to other water sources for 2 weeks.

Baycox® oral solution 2.5% (toltrazuril: 10 mg/kg, PO, once, or in medicated feeds for 2 to 6 days). Not for puppies < 3 weeks.





# ISOSPORA OHIOENSIS, I. BURROWSI, AND I. NEORIVOLTA

Middle-sized canine coccidians acquired by eating sporulated oocyst or infected rodent.

**PPP**= 6 to 7 days.

**Dx:** Oocyst in feces are clear, ellipsoid (17 to 27  $\mu\text{m}$  x 16 to 23  $\mu\text{m}$ ).

**Habitat:** *Isospora ohioensis*: schizonts in intestinal cells of the jejunum, gametocytes in epithelial cells of small intestine, cecum and colon.

*Isospora burrowsi*: schizonts and gametocytes in lamina propria of the caudal 3/5ths of small intestine. *Isospora*

*neorivolta*: lamina propria of the posterior 1/2 of small intestine.

**Similar Species:** Cannot distinguish these 3 species using oocyst morphology. Need to separate from smaller organisms of potential zoonotic importance.

**Range:** World.

**Clinical Signs:** Diarrhea that can be hemorrhagic. Can cause death in heavy infections.

**Tx:** Once oocysts appear in feces, most of the damage from development in the mucosa has already occurred. Sulfonamides are the drugs of choice:

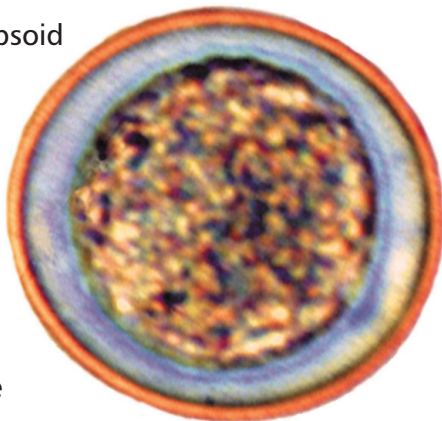
Tribissen® tablets (sulfadiazine-trimethoprim: 30 mg/kg, PO, q12h for 5 days)

Albon® (sulfadimethoxine: 50 mg/kg, PO, q24h for 1 – 3 weeks)

Primor® (sulfadimethoxine-ormetoprim (66 mg/kg, PO, q24h for 1 – 3 weeks)

Corid® (amprolium: 1.25% oral crumbles, 9.6% solution, 20% soluble powder: 100 mg (pups < 10 kg) or 200 mg (pups > 10 kg) total dose, PO, q24h for 1 – 2 weeks.) If added to food (bitches and pups) 250 – 300 mg total dose, 20% powder on food up to 2 weeks. If added to water, 30 ml of 9.6% solution to 3.8 L (1 gallon) of water with no access to other water sources for 2 weeks.

Baycox® oral solution 2.5% (toltrazuril: 10 mg/kg, PO, once, or in medicated feeds for 2 – 6 days). Not for puppies <3 weeks.





## IXODES SCAPULARIS (ALSO CALLED I. DAMMINI)

Deer tick, lyme disease tick, black-legged tick.  
Attach to skin from brush or scrub.

**Dx:** Usually find adults, 3 to 7 mm, flat to bean shaped when engorged. Shades of brown (scutum darker than body), characteristic preanal groove on all stages. Nymphs look like small females

**Habitat:** Skin.

**Similar Species:** *Dermacentor variabilis*.  
*Rhipicephalus sanguineus*.

**Range:** Eastern US, other species in western states.

**Clinical Signs:** Usually none, many can cause anemia.

**Potential Zoonosis:** No direct transmission of pathogens without attachment.

**Tx:** Removal – wash wound with alcohol.

May want to submit engorged ticks to diagnostic lab to see if infected with lyme disease organism. Vector of lyme disease and various ehrlichias.

### Spot Ons

Frontline® Top Spot® for dogs and puppies (Fipronil)

K9 Advantix™ (imidacloprid and permethrin) DO NOT USE ON CATS.

Adams™ spot-on Flea and Tick Control for Dogs (permethrin)

Scratchex® 30 Day Flea and Tick Treatment (Permethrin)

Vet-Kem® Ovitrol Plus® Spot On® Flea and Tick Control for dogs and puppies (Permethrin and (S)-Methoprene)

### Collars

Adams™ Delta Force™ Tick Collar for dogs (Deltamethrin)

Adams™ Dual Action Flea and Tick Collar for dogs

(O-Isopropoxyphenyl methylcarbamate, 3-Phenoxybenzyl d-cis and trans 2,2,- dimethyl-3-(2-methylpropenyl) cyclopropanecarboxylate, N-Octyl bicycloheptene diacarbonylimide)

Bansect® Flea & Tick Collars for dogs (Naled)

Happy Jack® Novation™ Flea and Tick Collar for dogs (Deltamethrin)

Hartz® 2 in 1® Flea and Tick Collar for dogs and puppies (Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for dogs (Tetrachlorvinphos)

Preventef® Flea and Tick Collar for Dogs (Diazinon)

Preventic® Collar for dogs (Amitraz)

Scratchex® Flea and Tick Collars for dogs (Chlorpyrifos)

Vet-Kem® Tickaway™ Tick Collar for dogs (Propoxur)







## LEISHMANIA DONOVANI

Visceral leishmanial organism of dog. Transmitted by sandfly bite, transplacentally.

**PPP=** Weeks to years.

**Dx:** Amastigotes in macrophages from skin scrapings or biopsies (aspirates) from nodes, bone marrow, or spleen. Serology: IFA and ELISA. Both cross react with *Trypanosoma cruzi*.

**Habitat:** Macrophages.

**Similar Species:** *Leishmania* spp. that cause only the cutaneous form of the disease.

**Range:** World. Dogs mainly seen infected in Mediterranean and Brazil, but recent reports of infections in United States (especially Foxhound population) indicate may have more regular transmission here than previously thought.

**Clinical Signs:** Lymphadenopathy, exercise intolerance, weight loss, fever, splenomegally, hyperkeratosis with excessive epidermal scale of muzzle, face and footpads—usually bilaterally symmetrical. Intradermal nodules and ulcers may occur in advanced cases. Long brittle nails. Terminally, renal failure (glomerulonephritis).

**Potential Zoonosis:** Organisms could transfer from dog into wound on people but very low risk. Dogs considered reservoir of infection for vectors where vectors are present.

**Tx:** No single drug or combinations totally curative. Design drug protocol around those available and owner compliance. Monitor renal function.

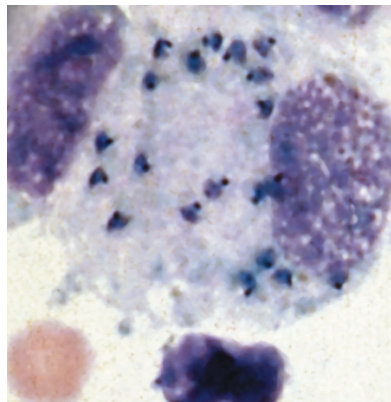
Pentostam® (Na stibogluconate; 30-50 mg/kg of pentavalent antimony, IV or SQ, q24h for 4 weeks). Note: only available in United States from CDC.

Glucantime® (meglumine antimonite; 75 mg/kg, SQ, q24h for 3-4 weeks concurrently with allopurinol; 15-30 mg/kg, q12h for 12 months or longer).

Allopurinol (10 to 30 mg/kg, q12h maintenance).

Fungizone® (amphotericin B; 0.5 to 0.8 mg/kg diluted in 10-60 ml of 5% dextrose, given over 30 seconds IV, q48h until total dose of 8-15 mg/kg). Subcutaneous route described: 0.5-0.8 mg/kg in 500 ml of 0.45% saline/2.5% dextrose, SQ to cumulative dose of 8-26 mg/kg).

AmBisome® (Liposome formulation of amphotericin B; 5 doses of 3 mg/kg).





## **MESOCESTOIDES SPP**

Tapeworm acquired by dogs eating infected amphibians, reptiles, birds, or small mammals.

**PPP=** 3 weeks.

**Dx:** Segment in feces (250 to 500  $\mu\text{m}$  long); sometimes chains of segments are passed. Small segments easily missed, but identified by the eggs being clustered in a single ball in the middle (about 30 or so eggs in the central packet, each egg containing a larva that has 3 pairs of small hooklets).

**Adult Habitat:** Small intestine.

**Similar Species:** There are a number of *Mesocestoides* species that have been described that could all infect dogs including *Mesocestoides kirbyi*, *M. latus*, *M. lineatus*, *M. litteratus*, and *M. manteri*. All are very similar and are probably found naturally in various wild species of canids or felids.

**Range:** World.

**Clinical Signs:** Typically asymptomatic. Occasionally, especially in the western United States, dogs develop severe and life-threatening infections with the larval stage within the peritoneal cavity which secondarily invades other organs such as the liver. There does not appear to be any correlation between the development of the intestinal infection and the visceral infection.

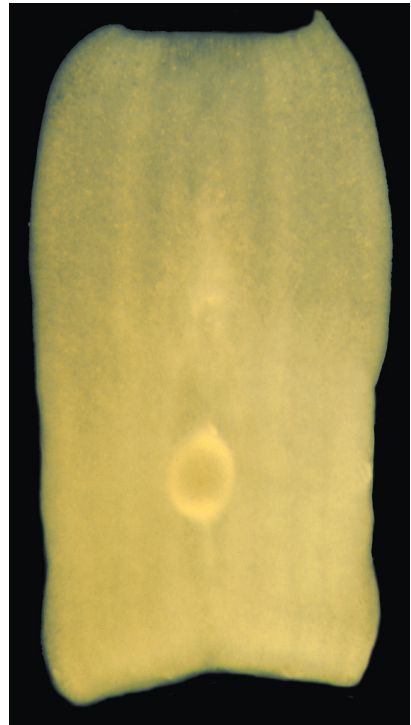
**Tx:** No approved drug. Praziquantel has been found efficacious on more than one occasion. It should be tried first at the labeled dose. Epsiprantel (Cestex®) may also be effective.

Drontal® Plus Tablets (not for puppies <3 weeks or 2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats







## NANOPHYETUS SALMINCOLA

Canine salmon poisoning fluke acquired by eating infected fish.

**PPP**= 5 to 8 days.

**Dx:** Egg in feces. Dogs often present with fever and diarrhea due to the infection with *Neorickettsia helminthoeca* transmitted in this fluke. Egg is brown, operculate on one end, with a small blunt point on the other, (75 to 80  $\mu\text{m}$  long).

**Adult Habitat:** Small intestine.

**Similar Species:** A number of exotic flukes that rarely infect dogs could have eggs of similar morphology.

**Range:** Northern Pacific rim.

**Clinical Signs:** Infection with the fluke probably asymptomatic. Fluke transmits *N. helminthoeca* which can produce a febrile illness.

**Tx:** No approved drug. Removed by routine praziquantel and epsiprantel. Need to treat rickettsial infection with tetracyclines.

Drontal® Plus Tablets (not for puppies < 3 weeks or 2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats





## NEOSPORA CANINUM

Small-sized canine coccidian acquired by eating infected beef. Dogs can be infected by ingestion of oocysts.

**PPP=** 6 to 9 days.

**Dx:** Oocysts in feces, clear, unsporulated, round to ovoid (10 to 13  $\mu\text{m}$  long).

**Habitat:** Small intestinal mucosa.

**Similar Species:** Cannot distinguish oocyst from that of *Hammondia heydorni*.

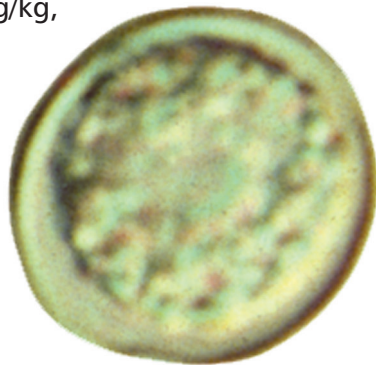
**Range:** World.

**Clinical Signs:** Asymptomatic. Dogs, especially if infected in utero, can develop severe disease, e.g., polyradiculitis with flaccid paralysis. Due to disseminated neosporosis.

**Tx:** No approved drug. Will probably respond to same treatments used for toxoplasmosis:

Antirobe<sup>®</sup> capsules or oral solution, or  
Cleocin<sup>®</sup> injectable solution  
(clindamycin: 10-20 mg/kg,  
PO, IM, q12h for  
2 weeks).

Tribissen<sup>®</sup> tablets  
(sulfadiazine-  
trimethoprim:  
15 mg/kg, PO, q12h  
for 14 days).





## OTODECTES CYNOTIS

Ear mite of dogs acquired by direct contact.

**Dx:** Mites in ear swabs or fecal examinations.

Mites (about 400  $\mu\text{m}$  long) have 8 rather long legs on a round body. Terminal stalks on legs (I and II of females, all legs of males, other leg terminate in setae) are short and unsegmented and end in sucker-like terminations. Eggs about 200  $\mu\text{m}$  long.

**Adult Habitat:** Ear canal.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Otitis with head shaking, scratching at the ears, production of cerumen. Can lead to severe secondary ear infections.

**Tx:** Several approved products:

Acarexx<sup>TM</sup>

Revolution<sup>TM</sup>

Milbemite<sup>TM</sup>

Pyrethrin based

products: (Aurimite<sup>®</sup>,

Cerumite<sup>®</sup>, Eradimate<sup>TM</sup>,

Happy Jack<sup>®</sup> Mitex<sup>TM</sup>,

Hartz<sup>®</sup> Health Measures<sup>TM</sup>

Ear Mite Treatment for

Dogs, Mita-Clear<sup>TM</sup>,

Nolvamite<sup>®</sup>,

OtiCare<sup>®</sup>-M Ear Mite

Treatment,

Otomite<sup>®</sup> Plus, Performer<sup>®</sup>

Ear mite Killer, Pet Care Ear

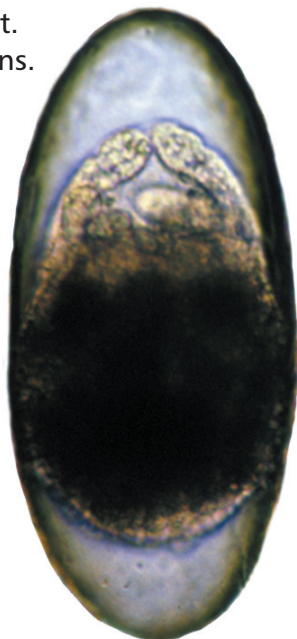
Mite Lotion & Repellent)

Rotenone based

products: (Ear Mite

Solution, Ear Mitecide,

Mitaplex-R<sup>TM</sup>)





## PARAGONIMUS KELLICOTTI

Lung fluke of the dog acquired by eating infected crayfish (or perhaps rodent hosts).

**PPP=** 5 to 7 weeks.

**Dx:** Eggs in feces are brown with seated operculum (or cap) and a small bump on abopercular end, 70 to 100  $\mu$ m long. Chest radiographs may show cystic lesions in lungs.

**Adult Habitat:** Cysts in lungs.

**Similar Species:** A number of species reported from dogs and cats around the world. Eggs must be distinguished from *Spirometra* and *Diphyllbothrium*.

**Range:** *P. kellicotti* in North America, but other species around the world.

**Clinical Signs:** Mild coughing, to paroxysmal coughing, with dyspnea; can have pneumothorax.

**Tx:** No approved drug. Praziquantel given at elevated dosages for several days is efficacious:

Droncit® Canine Cestocide Tablets (praziquantel 25 mg/kg every 8 hours for 3 days). Not for puppies <4 weeks.







## PEARSONEMA PLICA

Capillarid of canine bladder from ingesting earthworms or possibly other paratenic hosts.

**PPP**= 2 months.

**Dx:** Egg in urine, like *Trichuris vulpis*, but smaller (60  $\mu$ m long) with large surface pits.

**Adult Habitat:** Threaded through mucosa of urinary bladder wall.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Asymptomatic, but may have cystitis

**Tx:** No approved drug. After Tx, eggs may be passed in urine for several weeks after adults killed.

Potential therapy includes:

Ivomec® (ivermectin  
1% injection formulation:  
0.2 mg/kg, subcutaneously  
or PO, repeat in 2 weeks)







## PENTATRICHOMONAS HOMINIS

Trichomonad trophozoite of dogs; fecal-oral transmission.

**PPP**= 1 week.

**Dx:** Flagellated trophozoites (10  $\mu\text{m}$  long) in saline fecal preparation (destroyed typically by flotation media); move with a jerking forward motion. Can often visualize an undulating membrane on one caught in debris.

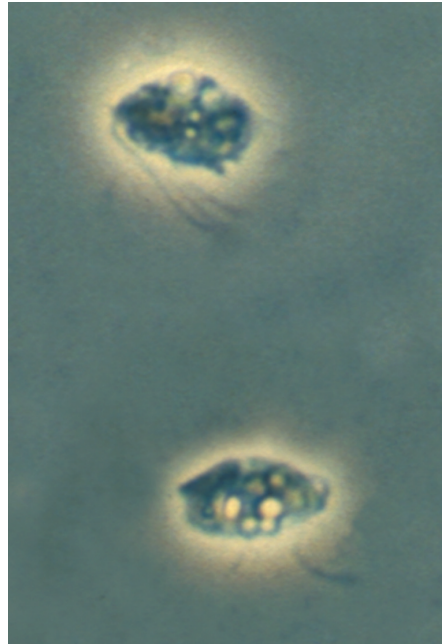
**Habitat:** Lumen of cecum and colon.

**Similar Species:** Need to distinguish trophozoite from that of *Giardia*.

**Range:** World.

**Clinical Signs:** Seen in dogs with diarrhea, probably not typically the cause.

**Potential Zoonosis:** Could be directly transmissible from feces to human caregivers. Routine precautions should be taken when handling canine fecal matter.



**Tx:** No approved drug. Metronidazole has been used:

Flagyl® oral tablets (metronidazole: 66 mg/kg, PO, q24h for 5 days. Note: At this dose, neurologic signs could develop. Do not dose for longer).



## PHYSALOPTERA RARA

Canine stomach worm. Adults attach to antrum of stomach and proximal duodenum. Intermediate host: coprophagous beetles.

**PPP=** 2 to 3 months.

**Dx:** Egg (45  $\mu$ m long) in feces slightly shorter than hookworm eggs, very clear, with a relatively thick shell containing a larva.

**Adult Habitat:** Stomach and proximal small intestine.

**Similar Species:** Related species occur in other canines, cats, foxes, skunks, and raccoons.

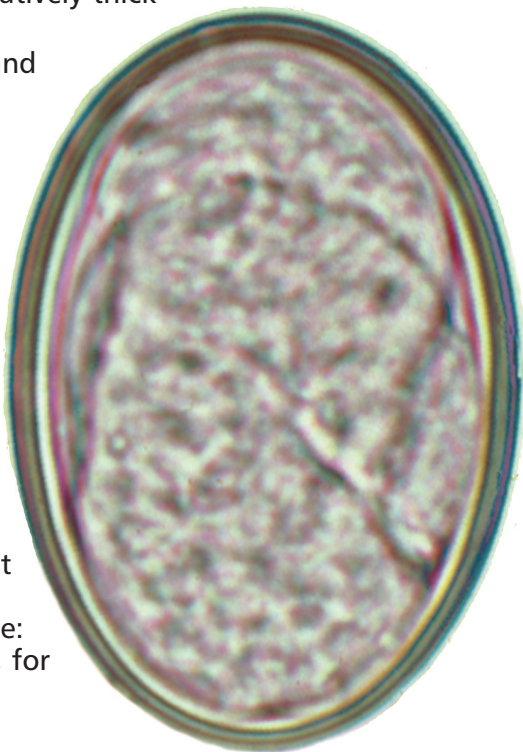
**Range:** World.

**Clinical Signs:** Vomiting.

**Tx:** No approved drug. Heartworm preventatives do not prevent infection. Treatments appearing efficacious:

Strongid®T (pyrantel pamoate: 5 mg/kg, PO, once; may repeat in 2 weeks)

Panacur® (fenbendazole: 50 mg/kg, PO, q24h, for 3 days)





## PNEUMONYSSOIDES CANINUM

Nasal mite of dogs acquired by direct contact.

**Dx:** Mites in nasal secretions or swab or fecal examinations. Mites over 1 mm long. Eggs about 200  $\mu\text{m}$  long.

**Adult Habitat:** Nasal sinuses.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Sneezing, reverse sneezing, and epistaxis.

**Tx:** No approved drug. Avermectins are efficacious. Selamectin may be effective.

Interceptor® (0.5 to 1 mg/kg once/week for 3 weeks). Not for puppies <6 weeks or 2 lbs.

Ivomec® (ivermectin: 0.2 to 0.4 mg/kg, once/week for 3 weeks)





## RHIPCEPHALUS SANGUINEUS

Brown dog tick. Attach to skin from brush or scrub.

**Dx:** Usually find adults, 3 to 7 mm, flat to bean shaped when engorged. Shades of brown. Have eyes on edges of scutum. No preanal groove. Nymphs look like small females

**Habitat:** Skin.

**Similar Species:** *Dermacentor variabilis*.  
*Ixodes scapularis*.

**Range:** Southern US, cannot stand freezing temperatures but will do well inside.

**Clinical Signs:** Usually none, many can cause anemia.

**Potential Zoonosis:** No direct transfer of pathogens without attachment. All stages (larva, nymph, and adult) feed on the dog. Can infest kennels and households. Vector of canine babesiosis.

**Tx:** Removal – wash wound with alcohol.

### Spot Ons

Frontline® Top Spot® for dogs and puppies (Fipronil)

K9 Advantix™ (imidacloprid and permethrin) DO NOT USE ON CATS.

Adams™ spot-on Flea and Tick Control for Dogs (permethrin)

Scratchex® 30 Day Flea and Tick Treatment (Permethrin)

Vet-Kem® Ovitrol Plus® Spot On® Flea and Tick Control for dogs and puppies (Permethrin and (S)-Methoprene)

### Collars

Adams™ Delta Force™ Tick Collar for dogs (Deltamethrin)

Adams™ Dual Action Flea and Tick Collar for dogs

(O-Isopropoxyphenyl methylcarbamate, 3-Phenoxybenzyl d-cis and trans 2,2,- dimethyl-3-(2-methylpropenyl)

cyclopropanecarboxylate, N-Octyl bicycloheptene diacarbonylimide)

Bansect® Flea and Tick Collars for dogs (Naled)

Happy Jack® Novation™ Flea and Tick Collar for dogs (Deltamethrin)

Hartz® 2 in 1® Flea and Tick Collar for dogs and puppies (Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for dogs (Tetrachlorvinphos)

Preventef® Flea and Tick Collar for Dogs (Diazinon)

Preventic® Collar for dogs (Amitraz)

Scratchex® Flea and Tick Collars for dogs (Chlorpyrifos)

Vet-Kem® Tickaway™ Tick Collar for dogs (Propoxur)





## SARCOCYSTIS SPP

Sporocysts in feces of dogs that have ingested muscle tissue of intermediate host.

**PPP=** 3 days to 3 weeks.

**Dx:** Clear, sporulated, ellipsoid sporocyst in feces (9 to 17  $\mu$ m long), sometimes seen paired within thin oocyst wall. Infectious when passed.

**Habitat:** Small intestinal mucosa.

**Similar Species:** This is a very large genus with many species infecting many different intermediate hosts. Sporocysts must be examined carefully to distinguish them from small oocysts and cysts of *Giardia canis*.

**Range:** World.

**Clinical Signs:** Asymptomatic.

**Potential Zoonosis:** Disease has been reported in people ingesting sporocysts; infectious dog feces should be handled with routine caution.

**Tx:** None.







## SARCOPTES SCABIEI

Scabies mite of dogs acquired by direct contact.

**Dx:** Mites in skin scrapings or fecal examinations. Mites (about 350  $\mu\text{m}$  long) have 8 legs and large stocky body spines. Terminal stalks on legs (I and II of females, and I, II, and IV of males; other legs terminate in setae) are long and unsegmented with sucker-like terminations. Egg about 200  $\mu\text{m}$  long.

**Adult Habitat:** Burrows in skin.

**Similar Species:** None.

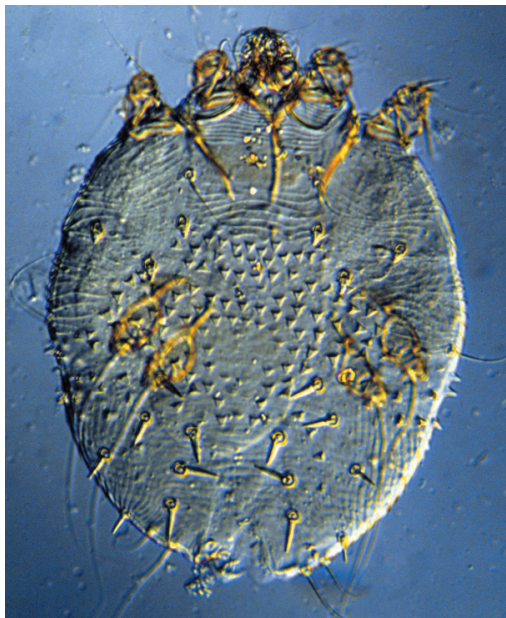
**Range:** World.

**Clinical Signs:** Pruritis, hyperkeratosis, alopecia, and self-inflicted trauma. Lesions typically begin on face or knees.

**Tx:** Two approved products, but often treated with bovine ivermectin administered at 200  $\mu\text{g}/\text{kg}$  body weight.

Mitaban<sup>®</sup>

Revolution<sup>™</sup>





## **SPIROCERCA LUPI**

Esophageal worm of dog living in nodules at base of esophagus and acquired by eating infected beetles, chickens, or rodents.

**PPP=** 5 to 6 months.

**Dx:** Thick-shelled egg in feces is narrow, clear, and small (35  $\mu$ m long, only as long as the egg of taeniid tapeworms) with a larva when passed in the feces. Egg most likely be confused with *Physaloptera rara*, but narrower.

**Adult Habitat:** Nodules at the base of the esophagus and in the stomach.

**Similar Species:** None.

**Range:** Southern United States and tropics.

**Clinical Signs:** Esophageal nodules can cause dysphagia and vomiting. Dog may become anorexic and emaciated.

Migrating larvae cause aortic lesions with aneurysms/rupture.

Fibrosarcomas/osteosarcomas of esophagus; T<sub>5</sub>–T<sub>10</sub> discospondylitis can occur.

**Tx:** No approved drug. Sx to remove nodules has been successful.

Sergeant's® Worm-Away® for Dogs  
(piperazine citrate, 1570 mg [contents of about 11 capsules]/day for 3 days)

Dectomax® Injectable solution (doramectin, 200  $\mu$ g/kg SQ, 3 injections 2 weeks apart. May require another Tx with 500  $\mu$ g/kg PO daily for 6 weeks)





## **SPIROMETRA MANSONOIDES**

Canine/feline tapeworm acquired by eating infected snakes, rodents, and other small vertebrates.

**PPP=** As short as 10 days, and patency can be maintained for several years.

**Dx:** Egg (60  $\mu$ m long) in feces is brown, elongate, with a small operculum (or cap) on one end, containing cells of the developing larva. Egg about the size of *Ancylostoma caninum* egg.

**Adult Habitat:** Small intestine.

**Similar Species:** There are a number of species of *Spirometra* around the world. Egg very similar to that of *Diphylobothrium latum*.

**Range:** United States.

**Clinical Signs:** May have diarrhea, emaciation, and/or vomiting. Clinical disease appears less common in the dog than in the cat, perhaps because dogs are less often infected.

**Tx:** No approved drug. Some report success treating with praziquantel at 5 mg/kg, but others report the need for elevated doses. Epsiprantel (Cestex®) may also be effective. Albendazole not effective.

Drontal® Plus Tablets (not for puppies <3 weeks or 2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats

If Tx is unsuccessful, try

Droncit® Canine Cestocide Tablets (praziquantel 7.5 mg/kg x 2 days or 25 mg/kg x 2 days) Not for puppies 4 weeks.





## STRONGYLOIDES STERCORALIS

Intestinal threadworm of dogs. Infection by larvae penetrating skin or transmammary. Larva in feces develops to infective stage outside dog. Can have significant environmental contamination, especially in densely populated kennels.

**PPP=** 2 weeks.

**Dx:** Larva (380  $\mu\text{m}$  long) in feces has large genital rudiment (longer than body is wide), esophagus with three distinct sections (corpus, isthmus, and bulb), and a long straight tail.

**Adult Habitat:** Threaded through small intestinal mucosa.

**Similar Species:** Five nematode larvae are found in dog feces: *Strongyloides stercoralis*, *Filaroides osleri*, *Filaroides hirthi*, *Crenosoma vulpis*, and sometimes hatched *Ancylostoma* larvae. Hatched larvae of *Ancylostoma* are longer, have a smaller genital primordium, and a marked buccal cavity. Larvae of *Filaroides osleri* and *Crenosoma vulpis* bare an esophagus that does not become thinner in the middle.

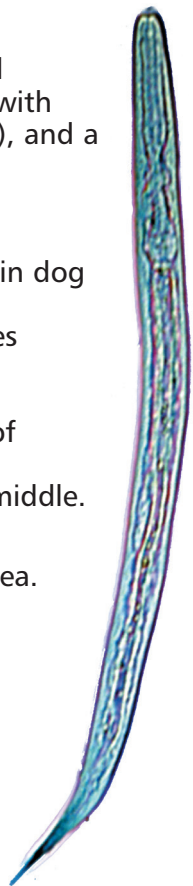
**Range:** World.

**Clinical Signs:** Usually asymptomatic. Mild diarrhea. Severe/fatal infections in young nursing puppies (transmammary transmission) or in dogs severely immunosuppressed. Severe infections mimic viral enteritis.

**Potential Zoonosis:** Causes similar infection in human beings.

**Tx:** No approved drug. Ivermectin approved to Tx humans in the United States. Can Tx bitch at parturition.

Ivomec® (ivermectin 1% injection  
formulation: 0.2 mg/kg, PO, once;  
repeat in 2 weeks)







## TAENIA PISIFORMIS

Rabbit tapeworm. Dogs acquire infection by eating rabbit viscera.

**PPP=** 2 months.

**Dx:** Find segments (500 to 1000  $\mu\text{m}$  long) or taeniid eggs (30 to 35  $\mu\text{m}$  long) in feces.

Segment recognized by rectangular appearance with single lateral reproductive pore. Can tease apart segment to reveal typical eggs.

**Adult Habitat:** Small intestine.

**Similar Species:** Dogs are host to other *Taenia* spp. (*T. ovis*, *T. multiceps*, etc.), but the segments can only be identified by experts and no way to tell eggs apart. Other tapeworm segments that can be found in dog feces: *Dipylidium caninum*

(reproductive pores on each side of segment), and *Spirometra*, *Diphyllbothrium*, and *Mesocestoides* which all have medial pore on each segment, so it appears as though they do not have a pore unless one looks quite carefully. The eggs of *Taenia* are indistinguishable from those of *Echinococcus*.

**Range:** World.

**Clinical Signs:** Asymptomatic.

**Tx:** Effective approved products:

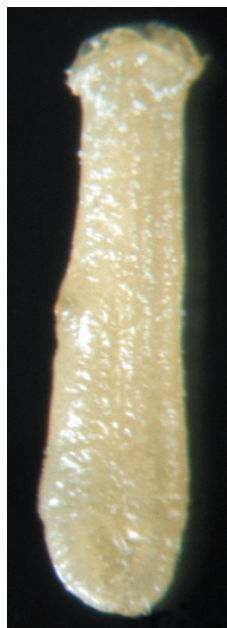
Panacur® Granules 22.2%

Drontal® Plus Tablets (not for puppies <3 weeks or <2 lbs)

Cestex® (not for puppies <7 weeks)

Droncit® Canine Cestocide Tablets (not for puppies <4 weeks)

Droncit® Injectable Cestocide for Dogs and Cats







## TOXASCARIS LEONINA

Common roundworm of dogs (and cats). Typically not seen in puppies (no prenatal infection).

**PPP**= 2 months.

**Dx:** Egg (ovoid, 90  $\mu$ m long) in feces has thick, smooth shell with the internal ovum appearing light in color. Eggs develop rapidly.

**Adult Habitat:** Small intestine.

### Similar Species:

*Toxocara canis*: similar size and shape, but has dimpled eggshell and a darker colored ovum.

**Range:** World, but more common in cooler climates.

**Clinical Signs:** Typically none. Rarely present in sufficient numbers to cause disease. Due to rapidly developing egg, can build up large numbers in kennels or zoos.

**Potential Zoonosis:** Visceral larva migrans in children.

**Tx:** Will work at the labeled dose even if not so indicated on the label. Large range of products used as per label instructions:

Nemex™

Panacur® Granules 22.2%

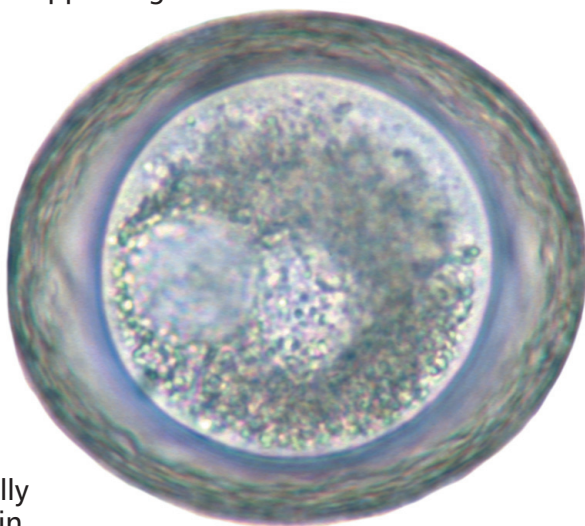
Drontal® Plus (not for puppies <3 weeks or 2 lbs)

Heartgard® Plus (not for puppies <6 weeks)

Interceptor® (not for puppies or <6 weeks or 2 lbs)

Sentinel™ (not for puppies or <4 weeks or 2 lbs)

Sentinel™ Flavor Tabs® (not for puppies <4 weeks or 11 lbs)





## **TOXOCARA CANIS**

Common canine roundworm. Puppies can acquire large numbers of worms *in utero*.

**PPP=** Puppies begin shedding eggs as early as 3 to 4 weeks after birth.

**Dx:** Eggs (spheroid, 90  $\mu$ m long) in feces of dogs of all ages. Eggshell has a characteristic pitted surface.

**Adult Habitat:** Small intestine.

**Similar Species:** The egg of *Toxascaris leonina* is similar in size, but has a smooth shell and the ovum tends to be lighter in color.

**Range:** World

**Clinical Signs:** Pups: listless, inappetent, large abdomens, poor hair coat. Severe infections: constipation, diarrhea, and possibly abdominal pain (palpation). Large numbers of worms: intestinal blockage or perforation.

**Potential Zoonosis:** Visceral and ocular larva migrans in children.

**Tx:** Large number of products used as per label instructions:

Nemex™

Panacur® Granules 22.2%

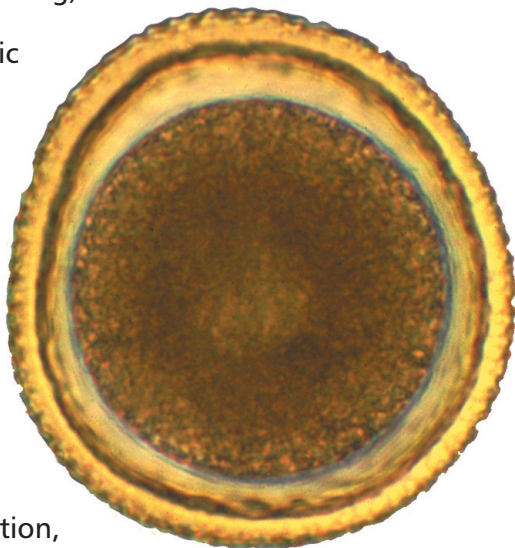
Drontal® Plus (not for puppies <3 weeks or 2 lbs)

Heartgard® Plus (not puppies <6 weeks)

Interceptor® (not for puppies <6 weeks or 2 lbs)

Sentinel™ (not for puppies <4 weeks or 2 lbs)

Sentinel™ Flavor Tabs® (not for puppies <4 weeks or 11 lbs)





## TRICHODECTES CANIS

Dog louse, chewing. Direct contact with other infested dogs.

**Dx:** Usually find adults, 1 to 2 mm, clinging to hairs. Elongate organism with wide head, often cream-colored to light brown. Wide head separates it from the less common sucking louse of the dog (*Linognathus setosus*). Male and female similar in appearance. Egg with small cap (operculum).

**Habitat:** Cling to hair. Eggs (gnits) are glued to hairs.

**Similar Species:**

*Ctenocephalides felis*.

**Range:** World.

**Clinical Signs:** Usually none, cause pruritus.

**Comment:** Infestation usually indicates poor housing conditions or many dogs sharing the same space.

**Potential Zoonosis:** None.

**Tx:** Need to insure that animals are receiving adequate care at home.

Advantage (Imidacloprid)

Defend® Exspot® Treatment  
for dogs

Frontline (Fipronil)

Revolution (Selamectin)





## TRICHURIS VULPIS

Canine whipworm, common in dogs >3 months. Direct life cycle.

**PPP=** 3 months.

**Dx:** Egg in feces is brown, lemon-shaped, with polar plugs and a smooth shell, and about as long (80  $\mu\text{m}$ ) as a *Toxocara canis* egg is wide. Capillariid eggs found in dog feces are smaller than *Trichuris vulpis*.

**Adult Habitat:** Cecum, when present in numbers >100 also in colon.

**Similar Species:** None.

**Range:** World. Most common in areas with clay soils.

**Clinical Signs:** Large bowel diarrhea (large numbers)  $\pm$  anemia. Reddish-brown feces in heavy infections.

**Tx:** Different spectrum of drugs than for roundworms and hookworms. Active products are benzimidazoles and milbemycin oxime. Three heartworm preventative products (Filaribits Plus<sup>®</sup>, Interceptor<sup>®</sup>, and Sentinel<sup>™</sup>) have activity against whipworms. Drugs used at the labeled dose include:

Panacur<sup>®</sup> Granules 22.2%

Drontal<sup>®</sup> Plus (not for puppies <3 weeks or 2 lbs)

Interceptor<sup>®</sup> (not for puppies <6 weeks or 2 lbs)

Sentinel<sup>™</sup> (not for puppies <4 weeks or 2 lbs)

Sentinel<sup>™</sup> Flavor Tabs<sup>®</sup> (not for puppies <4 weeks or 11 lbs)





## TRYPANOSOMA CRUZI

American trypanosomiasis. Transmitted by reduviid bugs.

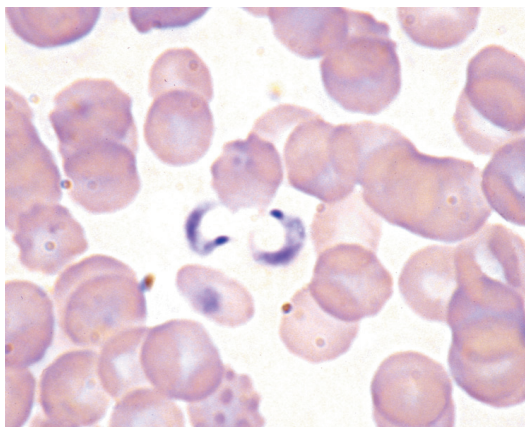
**PPP=** 6 to 9 days.

**Dx:** Small C-shaped, trypomastigote with large terminal kinetoplast in blood and amastigotes in biopsies.

**Habitat:** Blood and tissues.

**Similar Species:** The amastigote stage is indistinguishable from that of the *Leishmania* spp. although *T. cruzi* infects a number of cell types where *Leishmania* only infects macrophages.

**Range:** Americas. United States isolates are less pathogenic than South American isolates.



**Clinical Signs:** Asymptomatic. Acute disease (2 to 3 weeks post-infection): acute cardiomyopathy (weakness, pale mucus membranes, anorexia, lymphadenopathy) or diffuse neurologic signs seen mainly in young dogs (must differentiate from distemper). Chronic disease (months to years post-infection) – dilated cardiomyopathy (weakness, exercise intolerance, ascites, ventricular arrhythmias).

**Potential Zoonosis:** Infected blood potential source of infection to laboratory staff, veterinarians, animal technicians.

**Tx:** Supportive treatment for cardiac manifestations of disease. Benznidazol removes organism from blood and may decrease severity of disease in chronic stage but unknown in dogs.

Ragonil® (benznidazol; 5 mg/kg, q12h for 30 days. Side effects include fever, nausea, GIT signs. Stop Tx until signs abate, then cut back to q24h). Note. Not available in the United States except from CDC.





## UNCINARIA STENOCEPHALA

Canine hookworm of cooler climates. Not seen in puppies (no transmammary transmission).

**PPP=** 2 weeks.

**Dx:** Elongate, ellipsoid egg (90  $\mu$ m long) in feces has thin shell, usually passed in the eight-celled stage, and larger than *Ancylostoma* spp. eggs. If eggs develop and hatch in feces L1 (290-360 $\mu$ m), will have a short esophagus with a bulb at its base and a small genital primordium (compare with *Strongyloides*).

**Adult Habitat:** Small intestine.

**Similar Species:** Other hookworms have similar eggs, but *Uncinaria* is larger.

**Range:** Focal areas of concentration in northern United States.

**Clinical Signs:** Disease rare (least pathogenic of all canine hookworms) unless high build up of contamination occurs in kennel. Signs: anemia, melena, and diarrhea or constipation.

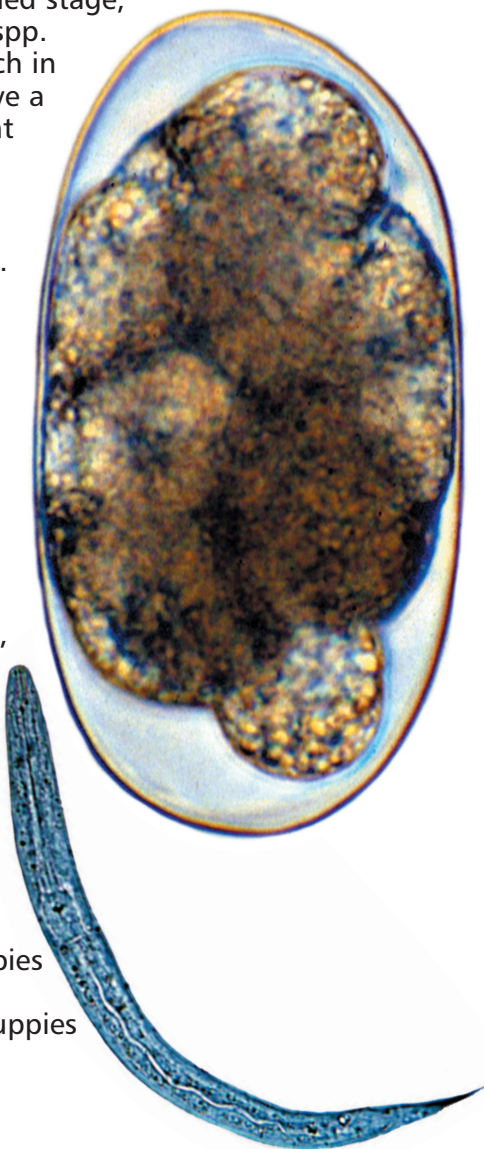
**Tx:** Interceptor<sup>®</sup> and Sentinel<sup>™</sup> with the active ingredient milbemycin oxime are ineffective against *Uncinaria stenocephala*. Drugs used at the labeled dose include:

Nemex<sup>™</sup>

Panacur<sup>®</sup> Granules 22.2%

Drontal<sup>®</sup> Plus (not for puppies  
<3 weeks or 2 lbs)

Heartgard<sup>®</sup> Plus (not for puppies  
<6 weeks)



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## AELUROSTRONGYLUS ABSTRUSUS

Feline lungworm obtained by ingestion of infected rodents and birds.

**PPP=** 5 weeks.

**Dx:** Larva (375  $\mu$ m long) in feces is very active, easy to recover in a Baermann funnel; has a distinctive dorsal spine on the tail. Larva easily recovered during transtracheal wash which also may contain elevated eosinophil numbers. Chest radiographs show diffuse poorly defined nodular densities – caudal lung fields most involved. Post-Tx radiographs look worse even when clinical signs improved.

**Adult Habitat:** Threaded through lung parenchyma.

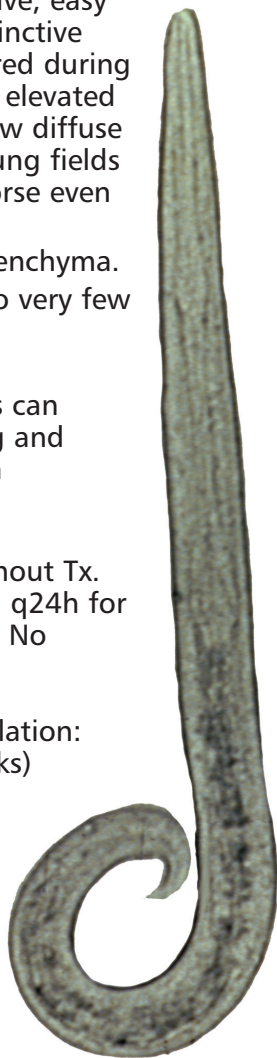
**Similar Species:** Cats are commonly host to very few worms producing larvae in feces.

**Range:** World.

**Clinical Signs:** Usually asymptomatic. Signs can range from mild cough, to severe wheezing and respiratory distress. Must differentiate from asthma, heart worm, cardiac disease, and *Paragonimus* infection.

**Tx:** Asymptomatic cases usually resolve without Tx. Corticosteroids (prednisone; 0.5 mg/kg, PO, q24h for 5 days) will reduce severity of clinical signs. No approved drugs to kill adults, but effective treatments include:

- Ivomec® (ivermectin 1% injection formulation:  
0.4 mg/kg, SQ or PO, repeat in 2 weeks)
- Panacur® (fenbendazole: 50 mg/kg, PO,  
q 24h, for 5 to 10 days)





## ALARIA MARCIANAE

Larger intestinal fluke acquired by eating amphibian or mammalian hosts.

**PPP=** 3 weeks.

**Dx:** Egg in feces large (110 to 130  $\mu\text{m}$  long) and brown with contained cells of embryo.

Will often appear clear on sugar flotation.

**Adult Habitat:** Small intestine.

**Similar Species:** There are a number of species of *Alaria* that could infect cats.

**Range:** Species around the world.

**Clinical Signs:** Asymptomatic.

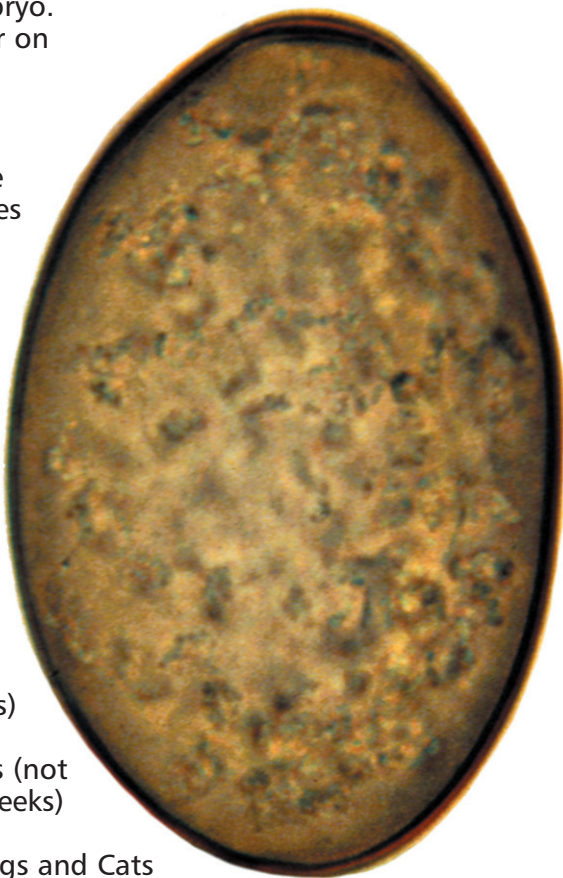
**Tx:** Praziquantel efficacious, also probably epsiprantel.

Drontal® Tablets  
(not for kittens  
<4 weeks or  
1.5 lbs)

Cestex® (not for  
kittens <7 weeks)

Droncit® Feline  
Cestocide Tablets (not  
for kittens <6 weeks)

Droncit® Injectable  
Cestocide for Dogs and Cats  
(not for kittens <6 weeks)





## ANCYLOSTOMA BRAZILIENSIS

Canine/feline hookworm common along southern Atlantic seacoast and Caribbean. Transcutaneous infection and rodent paratenic hosts.

**PPP=** Kittens shed eggs as early as 2 weeks after birth (transmammary infection).

**Dx:** Elongate, ovoid (60  $\mu\text{m}$  long), thin-shelled egg passed in feces in the 8-celled stage, is indistinguishable from *Ancylostoma caninum*. *Ancylostoma* eggs are smaller than *Uncinaria* eggs. If eggs develop and hatch in feces. L1 (300-400  $\mu\text{m}$ ) will have a short esophagus with a bulb at its base and a small genital primordium (compare with *Strongyloides*).

**Adult Habitat:** Small intestine.

**Similar Species:** *Ancylostoma caninum*.

**Range:** Southern Atlantic seacoast and Caribbean.

**Clinical Signs:** Regenerative anemia. *Ancylostoma braziliensis* causes less blood loss than *Ancylostoma tubaeforme*, so is less likely to cause acute disease.

**Potential Zoonosis:** Cutaneous larva migrans in the southeastern United States and Caribbean islands.

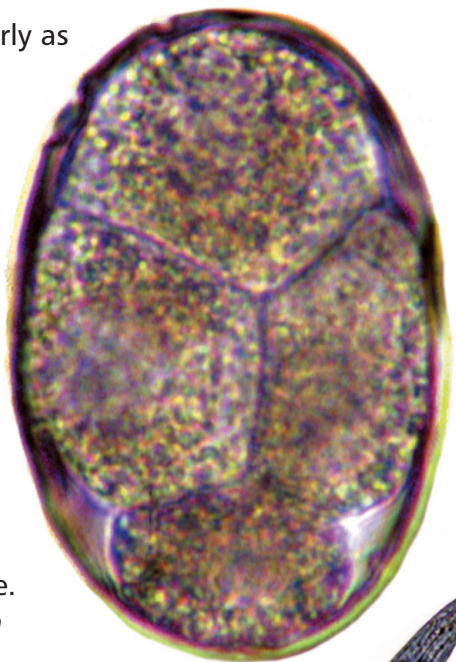
**Tx:** Drugs to clear the adult infections at the labeled dose include:

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Revolution™ (not for kittens <6 weeks)

Task® Tabs (not for kittens <10 days or 1 lb)

Interceptor® Flavor Tabs (not for kittens <6 weeks or 1.5 lbs)







## ANCYLOSTOMA TUBAEFORME

Common feline hookworm (most pathogenic). Transcutaneous infection and uses rodent paratenic hosts.

**PPP=** Cats can shed eggs as early as 2 weeks after birth (transmammary infection).

**Dx:** Elongate ellipsoid (60  $\mu\text{m}$  long), thin-shelled egg passed in feces in the 8-celled stage, is indistinguishable from

*Ancylostoma braziliensis*.

*Ancylostoma* eggs are smaller than *Uncinaria* eggs. If eggs develop and hatch in feces, L1 (300-400  $\mu\text{m}$ ) will have a short esophagus with a bulb at its base and a small genital primordium (compare with *Strongyloides*). Found in feces.

**Adult Habitat:** Small intestine.

**Similar Species:** *Ancylostoma braziliensis*.

**Range:** World.

**Clinical Signs:** Regenerative anemia. Cats can develop severe acute blood-loss anemia and die from hookworm infections with this species.

**Tx:** Drugs to clear the adult infections at the labeled dose include:

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Revolution™ (not for kittens <6 weeks)

Task® Tabs (not for kittens <10 days or 1 lb)

Interceptor® Flavor Tabs (not for kittens <6 weeks or 1.5 lbs)





## AONCHOTHECA PUTORII

Capillarid of feline stomach. Life cycle direct.

PPP= 1 month.

**Dx:** Egg in feces is similar to *Trichuris vulpis*, but smaller (60  $\mu$ m long) and darker, with polar plugs often at some angle off the linear axis; deep striations on the surface.

**Adult Habitat:** Threaded through gastric mucosa.

**Similar Species:** *Eucoleus aerophilus* of the bronchial epithelium.

**Range:** World.

**Clinical Signs:** Asymptomatic, but may have anorexia, intermittent vomiting, and tarry feces. May have mild regenerative blood-loss anemia.

**Tx:** No approved drug. After Tx, eggs may be passed in feces for several weeks after adults are killed.

Potential therapies include:

Panacur® (fenbendazole:  
50 mg/Kg, PO, q24h for  
3 days). Extend Tx to a week  
or treat every other week for  
2 months.

Ivomec® (ivermectin 1%  
injection formulation:  
0.2 mg/kg, SQ or PO,  
repeat in 2 weeks)





## CHEYLETIELLA BLAKEI

Hair-clasping mite of cats acquired by direct contact.

**Dx:** Mites in skin scrapings or fecal examinations. Mites (500 to 600  $\mu\text{m}$  long) have 8 legs and formidable palpal claws on the anterior end that are diagnostic. Eggs are large and glued to hairs; in feces have projections on one end (remnant of glue). Mites found in skin scrapings and fecal examinations of normal cats.

**Adult Habitat:** Hair.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** None or mild dermatitis.

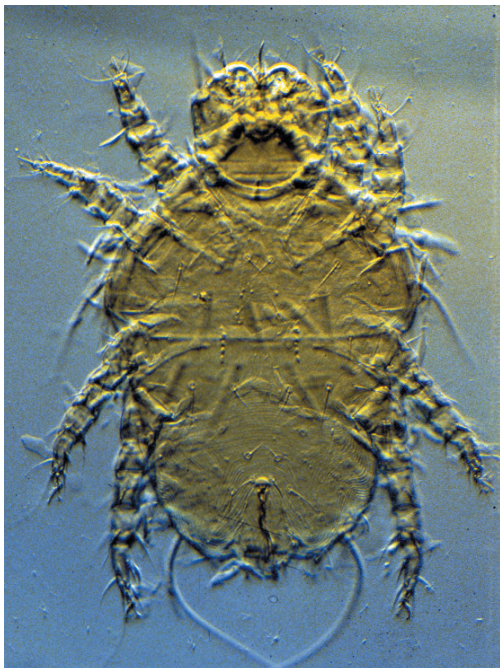
**Potential Zoonosis:**

People handling cats with cheyletiellosis have developed transient lesions on arms.

**Tx:** Can be treated with pyrethrin or permethrin dips, mists, or sprays.

Defend® Just for Cats™  
Insecticide  
(pyrethrin)

Frontline® Top Spot® for cats and kittens (fipronil)





## CRYPTOSPORIDIUM FELIS

Tiny coccidian acquired by ingestion of an oocyst (infectious when passed).

**PPP=** 5 to 7 days.

**Dx:** Oocysts (5  $\mu$ m in diameter) in feces easiest to see in sugar flotation.

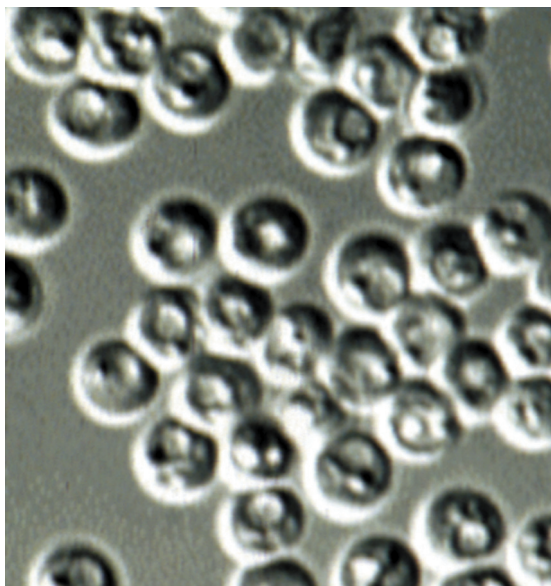
**Habitat:** Small intestinal mucosa.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Usually asymptomatic. Cats with some other immunosuppressive disorder can develop severe diarrhea.

**Potential Zoonosis:** Unclear how many humans infected with feline species, but must treat oocysts in cat feces as potentially infectious to humans.



**Tx:** No approved drug. Paromomycin effective but use with care in young and cats with severe diarrhea. Tylosin reported effective in one cat.

Humatin® (paromomycin: 125 – 165 mg/kg, PO, q12h for 5 days). NOTE: if GIT inflamed, drug may be absorbed into blood and cause aminoglycoside nephropathy.

Tylan® soluble powder (100 gm containers; ~3g/teaspoon).

Dose for cat: 11 mg/kg, PO, q12h for 4 weeks.





## CTENOCEPHALIDES FELIS

Common cat and dog flea.

**Dx:** Adult, 1 to 3 mm, dark brown to black with combs (lines of thick bristles) on cheek and neck, laterally compressed, six legs.

**Habitat:** Haircoat. Eggs and larvae mainly in bedding.

**Similar Species:** *Trichodectes canis* (dogs). *Felicola subrostratus* (cats)

**Range:** Worldwide.

**Clinical Signs:** Usually none, many can cause anemia.

**Comments:** Vector of *Dipylidium caninum* – flea infected as larva.

**Potential Zoonosis:** Feces may transmit cat scratch fever.

**Tx:** Removal followed by bathing. Very heavy infections may require transfusions.

### Injectable

Program® 6-month Injectable for cats (Lufenuron)

### Oral

Capstar® (Nitenpyram)

Program® Flavor Tabs® (Lufenuron), Program® Suspension

### Spot Ons

Advantage (Imidacloprid)

Hartz® Advanced Care™ Brand Once-a-Month™ Flea and Tick Drops for cats and kittens (Phenothrin)

Revolution (Selamectin)

### Collars

Adams™ Dual Action Flea and Tick Collar for Cats

(O-Isopropoxyphenyl methylcarbamate, 3-Phenoxybenzyl d-cis and trans 2,2,- dimethyl-3-(2-methylpropenyl) cyclopropanecarboxylate, N-Octyl bicycloheptene diacarbonylimide)

Bansect® Flea and Tick Collars for cats (Naled)

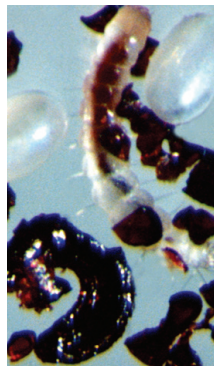
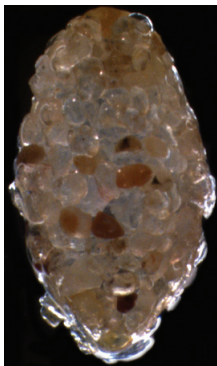
Hartz® 2 in 1® Flea and Tick Collar for cats and kittens (Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for cats (Tetrachlorvinphos)

Preventef® Flea and Tick Collars for cats (Diazinon)

Scratchex® Flea and Tick Collar for cats (Chlorpyrifos)

Vet-Kem® Breakaway® Plus Flea and Tick Collars for cats (Propoxur and (S)-Methoprene)







## CYTAUXZOOON FELIS

Small *Babesia*-like organism in cat RBCs; transmitted by tick bite.

**PPP**= 1 to 3 weeks.

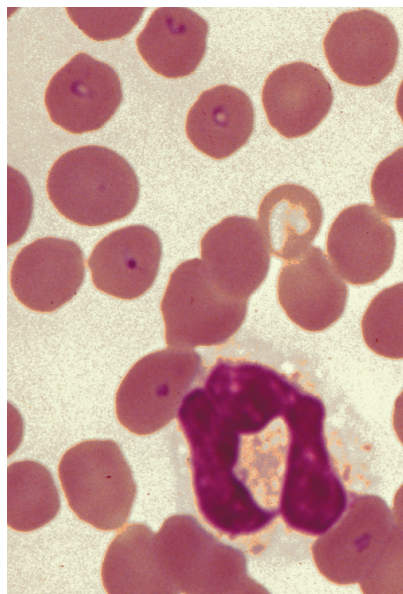
**Dx:** Trophozoites and gametocytes in RBCs; typically only 1% to 4% infected.

**Habitat:** RBCs. Damage due to schizonts in histiocytes may be apparent on bone-marrow aspirates.

**Similar Species:** None.

**Range:** South eastern and south central United States.

**Clinical Signs:** Cats usually are severely debilitated and typically have anemia, depression, high fever, dehydration, icterus, splenomegaly, and hepatomegally. Cats often die within 9 to 15 days after infection. More recently a less virulent form of the disease has been recognized that appears to be less fatal and not all cats have clinical signs.



**Tx:** Aggressively treat for DIC: isotonic fluids, heparin (150 U/kg, SQ, q8h), plasma. Imidocarb dipropionate has been found to produce a cure rate of 50%.

Imizol® (imidocarb dipropionate; 5 mg/kg, IM, twice, 2 weeks apart)

Berenil® (diminazine; 2 mg/kg, IM, twice, 7 days apart). Not available in United States.



## DEMODEX CATI

Follicular mite of cats acquired by direct contact.

**Dx:** Mites in skin scraping or fecal examinations. Both mites and eggs are elongate. Mites are 180 to 220  $\mu\text{m}$  long and have a characteristic elongate shape with very reduced legs on the anterior end. Eggs are also elongate and 70  $\mu\text{m}$  long.

**Habitat:** Hair follicles.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Often none. Mites are found in skin scrapings and fecal examinations of normal cats. Can have discrete focal areas of alopecia typically on the face—eyelids, chin, or neck. Also can have a generalized form with lesions on different parts of the body.

**Potential Zoonosis:**

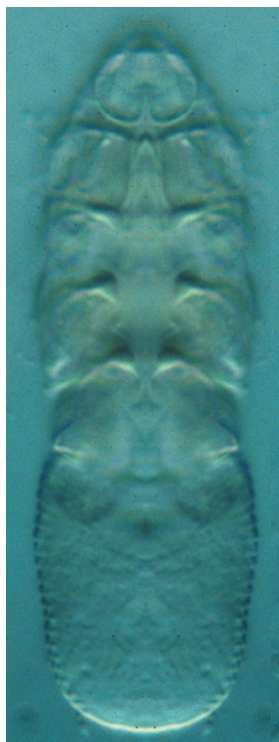
People handling cats with demodectic mange have developed transient lesions on arms.

**Tx:** Mitaban® (amitraz) can be used in cats at half the labeled dose (0.0125%) weekly. Often avermectins at increased dosages are used.

Mitaban® (at one-half labeled doses)

Interceptor® (2 mg/kg daily until condition clears; not for kittens <6 weeks or 1.5 lbs)

Ivomec® (ivermectin: 0.3 to 0.6 mg/kg, daily until condition clears – could take years).





## DERMACENTOR VARIABILIS

American dog tick. Attach to skin from brush or scrub.

**Dx:** Usually find adults, 3 to 15 mm, flat to bean shaped when engorged. Scutum is ornamented with patterns of white on a dark background. Have eyes on edges of scutum. No preanal groove. Nymphs look like small females.

**Habitat:** Skin.

**Similar Species:** *Rhipicephalus sanguineus*. *Ixodes scapularis*.

**Range:** Eastern US, western states have *Dermacentor andersoni*.

**Clinical Signs:** Usually none; may cause anemia.

**Comment:** Vector of feline Cytauxzoonosis.

**Potential Zoonosis:** No direct transfer of pathogens without attachment.

**Tx:** Removal – wash wound with alcohol.

### Spot Ons

Hartz® Advanced Care™ Brand  
Once-a-Month™ Flea and Tick  
Drops for cats and kittens  
(Phenothrin)

### Collars

Adams™ Dual Action Flea and Tick  
Collar for Cats (O-Isopropoxyphenyl  
methylcarbamate,  
3-Phenoxybenzyl d-cis and trans  
2,2,- dimethyl-3-(2-methylpropenyl)  
cyclopropanecarboxylate, N-Octyl  
bicycloheptene diacarbonylimide)

Bansect® Flea and Tick Collars for cats (Naled)

Hartz® 2 in 1® Flea and Tick Collar for cats and  
kittens (Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for cats (Tetrachlorvinphos)

Preventef® Flea and Tick Collars for cats (Diazinon)

Scratchex® Flea and Tick Collar for cats (Chlorpyrifos)

Vet-Kem® Breakaway® Plus Flea and Tick Collars for cats  
(Propoxur and (S)-Methoprene)





## DIPHYLLOBOTHRIUM LATUM

Feline broadfish tapeworm acquired by eating infected freshwater fish.

**PPP=** 5 to 6 weeks.

**Dx:** Eggs (60  $\mu$ m long) in feces about the size of *Ancylostoma tubaeforme* egg, brown, elongate, with a small operculum on one end containing cells of the developing larva.

**Adult Habitat:** Small intestine.

**Similar Species:** Some related exotic species around the world capable of infecting cats. Egg very similar to that of *Spirometra* spp.

**Range:** Northern freshwater lakes.

**Clinical Signs:**

Asymptomatic.

**Tx:** No approved drug. Praziquantel (35 mg/kg, PO, once) reported effective.

Drontal® Tablets (18.2 mg praziquantel/tablet; not for kittens <4 weeks or 1.5 lbs)

Droncit® Feline Cestocide Tablets (23 mg praziquantel/tablet; not for kittens <6 weeks)

Droncit® Injectable Cestocide for Dogs and Cats (56.8 mg praziquantel/ml; not for kittens <6 weeks)







## DIPYLIDIUM CANINUM

Feline (canine) flea tapeworm acquired by eating an infected flea.

**PPP=** 3 weeks.

**Dx:** Tapeworm segments (250 to 1000  $\mu\text{m}$  long) or egg balls (2 to 30 eggs/ball) in feces. Segments: recognized by paired lateral reproductive openings containing egg balls. Egg balls vary in size from a *Toxocara* eggs (if only contains a few) to 2 or 3 times the diameter of a *Toxocara* egg (if contains around 30 eggs).

**Adult Habitat:** Small intestine.

**Similar Species:** Other tapeworm segments found in cat feces: *Taenia taeniaeformis* (reproductive pores on only one side), *Spirometra* (medial pore), and *Mesocestoides* (paraauterine organ).

**Range:** World.

**Clinical Signs:** Asymptomatic. Motile segments appear on perianal fur of cat.

**Potential Zoonosis:** Occasionally infection occurs in children who ingest an infected flea. Usually asymptomatic, but motile segments may appear in diapers.

**Tx:** Approved drugs for *Dipylidium caninum* are formulated with either praziquantel or epsiprantel and are very efficacious as labeled.

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Cestex® (not for kittens <7 weeks)

Droncit® Feline Cestocide Tablets (not for kittens < 6 weeks)

Droncit® Injectable Cestocide for dogs and cats (not for kittens <6 weeks)







## ECHINOCOCCUS MULTILOCCULARIS

Very small tapeworm of dogs, rarely cats, acquired by eating infected small rodents.

**PPP**= 3 weeks.

**Dx:** Eggs (30 to 35  $\mu\text{m}$  long) in feces. If a purgative given (dangerous because eggs infectious to man), adult worms (2 mm) may be found in feces.

**Adult Habitat:** Small intestine.

**Similar Species:** Eggs of *Echinococcus* are indistinguishable from those of *Taenia*.

**Range:** Very rare in most of the United States. Found in Alaska, across Canada, and in the wild canid population the central states of the United States.

**Clinical Signs:** Asymptomatic.

**Potential Zoonosis:** Alveolar hydatid disease in humans who ingest the egg. **The egg is infectious when passed. The human disease is 100% fatal without treatment.**

**Tx:** Drug of choice: praziquantel (100% efficacious).

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Droncit® Feline Cestocide Tablets (not for kittens <6 weeks)

Droncit® Injectable Cestocide for Dogs and Cats  
(not for kittens <6 weeks)





## EUCOLEUS AEROPHILUS

Common respiratory capillarid of cats. Life cycle direct or possibly through earthworms.

**PPP=** 3 to 5 weeks.

**Dx:** Egg in feces is similar to *Trichuris vulpis*, but smaller (60  $\mu$ m long), with polar plugs often at some angle off the linear axis of the egg. Surface has a fine net-like ornamentation.

**Adult Habitat:** Mucosae of lungs and bronchi.

**Similar Species:** *Eucoleus boehmi* of the nasal sinuses.

**Range:** World.

**Clinical Signs:** Wheezing, coughing, lack of weight gain. Chronic dry nonproductive cough. Radiographs show diffuse peribronchial and interstitial infiltrate.

**Tx:** No approved drug. After Tx, eggs may be passed in feces for several weeks after adults are killed. Potential therapies include:

Panacur® (fenbendazole:  
50 mg/kg, PO, q24h for  
3 days). Extend treatment to a  
week or treat every other week  
for 2 months.

Ivomec® (ivermectin 1% injection  
formulation: 0.2 mg/kg,  
SQ or PO, repeat in 2 weeks)





## FELICOLA SUBROSTRATUS

Cat louse chewing. Direct contact with other infested cats.

**Dx:** Usually find adults 1 to 2 mm clinging to hairs. Elongate organism with wide triangular head, often cream-colored to light brown. Male and female similar in appearance. Eggs with a small cap (operculum).

**Habitat:** Cling to hair. Eggs (gnits) are glued to hairs.

**Similar Species:**

*Ctenocephalides felis*.

**Range:** World.

**Clinical Signs:** Usually none, cause pruritus.

**Potential Zoonosis:** None.

**Comment:** Only louse of cats.

**Tx:** Need to insure that animals receiving adequate care at home.

Advantage (Imidacloprid)

Frontline (Fipronil)

Revolution (Selamectin)

Flea, Tick, and Lice Shampoo

(Pyrethrins, Piperonyl

Butoxide, N-Octyl

bicycloheptene dicarboximide)





## GIARDIA FELIS

Flagellate trophozoites and cysts in feces of cats acquired by ingestion of infectious cyst.

**PPP=** 5 to 7 days.

**Dx:** Trophozoites and cysts in feces.

Trophozoites more common in loose stools; tennis-racket or tear-drop shaped (10 to 17  $\mu\text{m}$  long), two nuclei in the wider end, 8 trailing flagella, motile in saline preparations and have a gliding motion. Cysts most common in formed stools; ellipsoid, clear, and contain 4 nuclei; (about 10  $\mu\text{m}$  long).

**Habitat:** Small intestinal mucosa (surface).

**Similar Species:** Trophozoites must be distinguished from *Pentatrichomonas*. Cysts can be confused with sporocysts of *Sarcocystis* and oocysts of coccidian.

**Range:** World.

**Clinical Signs:** Usually asymptomatic, but can show small bowel diarrhea, often with high fat content.

**Potential Zoonosis:** *Giardia felis* can be transmitted to humans, but humans typically acquire infections from other humans. Routine precautions should be taken when handling feline fecal matter.

**Tx:** No approved drug. Benzimidazoles used most commonly now. Fenbendazole (Panacur) works at labeled dosage. Drontal and Albendazole have been used.

Panacur® Granules 22.2%

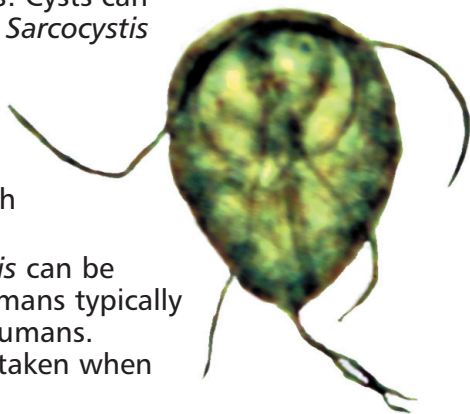
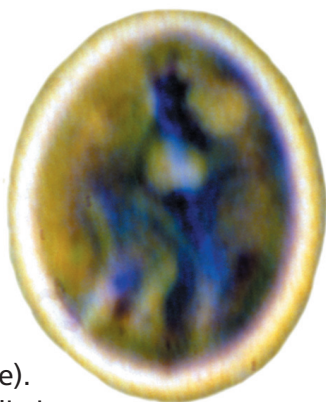
Valbazen® Cattle Dewormer Suspension (albendazole: 11.36% suspension, 114 mg/ml. Dose: 25 mg/kg, BID for 5 days.

Side effects: bone marrow suppression).

Flagyl® oral tablets (metronidazole: 25 mg/kg, PO, q12h for 5 days—67% efficacious).

Atabrine® oral tablets (quinacrine: 6.6 mg/kg, PO, q12h for 5 days—100% effective but 50% side effects of lethargy, fever).

Furoxone® tablets or oral liquid (furazolidone; 4 mg/kg, PO, q12h for 5 to 10 days)





## HAMMONDIA HAMMONDI

Small-sized feline coccidian acquired by eating infected mice, goats, deer, or other mammals.

**PPP**= 5 to 6 days.

**Dx:** Oocysts (10 to 13  $\mu\text{m}$  long) in feces, clear, unsporulated, spheroid.

**Habitat:** Small intestinal mucosa.

**Similar Species:** Oocysts indistinguishable from those of *Toxoplasma gondii*.

**Range:** World.

**Clinical Signs:** Asymptomatic.

**Tx:** None.







## ISOSPORA FELIS

Large-sized feline coccidian acquired by eating sporulated oocyst or infected rodent.

**PPP**= 7 to 11 days.

**Dx:** Oocyst (40 x 30  $\mu$ m) in feces, clear wall, ovoid, containing single sporoblast when fresh.

**Habitat:** Ileum.

**Similar Species:**

Easy to differentiate from other feline coccidia by large oocyst.

**Range:**

World.

**Clinical Signs:**

Diarrhea to soft mucoid feces. Very young kittens may have signs of enteritis (profuse diarrhea), emaciation, and sometimes death.

**Tx:** Once oocysts appear in feces, most of the damage from development in the mucosa has already occurred. Sulfonamides are the drugs of choice:

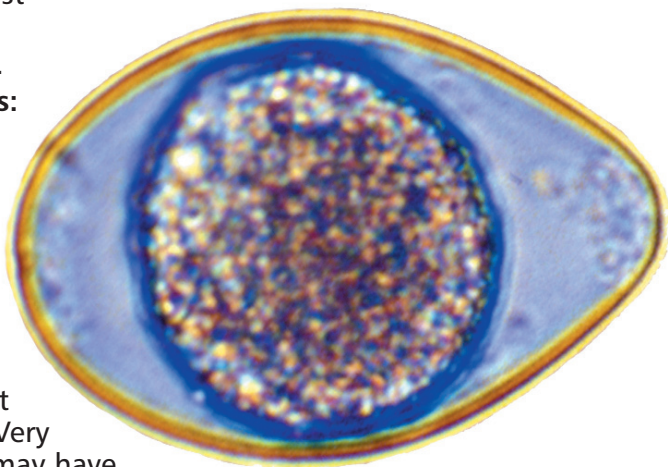
Tribissen® tablets (sulfadiazine-trimethoprim; 15 to 50 mg sulfadiazine plus 5 to 10 mg trimethoprim/kg, PO, q12h for 6 days; cats over 4 kg)

Albon® (sulfadimethoxine; 50 mg/kg, PO, once, then 27.5 mg/kg, PO, q24h until signs disappear)

Primor® (sulfadimethoxine-ormetoprim; 55 mg sulfadimethoxine plus 11 mg ormetoprim/kg, PO, q24h for up to 23 days)

Corid® 1.25% oral crumbles, 9.6% solution, 20% soluble powder (amprolium; 300 to 400 mg/kg, PO, q24h for 5 days; 110 to 220 mg/kg for 7 to 12 days; 20 to 40 mg/kg for 10 days)

Furoxone® tablets or oral liquid (furazolidone; 4 mg/kg, PO, q12h for 5 to 10 days)





## ISOSPORA RIVOLTA

Middle-sized feline coccidian acquired by eating sporulated oocyst or infected rodent.

**PPP=** 4 to 7 days.

**Dx:** Oocysts (18 to 28  $\mu\text{m}$  x 16 to 23  $\mu\text{m}$ ) in feces are clear and spheroid.

**Habitat:** Mucosa of small intestine.

**Similar Species:** Need to separate from smaller organisms of potential zoonotic importance.

**Range:** World.

**Clinical Signs:**

Pathogenic causing diarrhea in newborn but not weaned kittens.

**Tx:** Once oocysts appear in feces, most of the damage from development in the mucosa has already occurred. Sulfonamides are the drugs of choice:

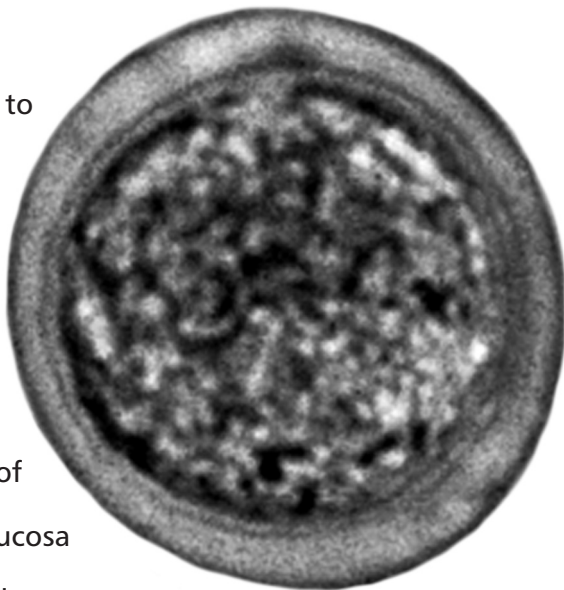
Tribissen® tablets (sulfadiazine-trimethoprim; 15 to 50 mg sulfadiazine plus 5 to 10 mg trimethoprim/kg, PO, q12h for 6 days; cats over 4 kg)

Albon® (sulfadimethoxine; 50 mg/kg, PO, once, then 27.5 mg/kg, PO, q24h until signs disappear)

Primor® (sulfadimethoxine-orometoprim; 55 mg sulfadimethoxine plus 11 mg ormetoprim/kg, PO, q24h for up to 23 days)

Corid® 1.25% oral crumbles, 9.6% solution, 20% soluble powder (amprolium; 300 to 400 mg/kg, PO, q24h for 5 days; 110 to 220 mg/kg for 7 to 12 days; 20 to 40 mg/kg for 10 days)

Furoxone® tablets or oral liquid (furazolidone; 4 mg/kg, PO, q12h for 5 to 10 days)





## IXODES SCAPULARIS (ALSO CALLED I. DAMMINI)

Deer tick, lyme disease tick, black-legged tick. Attach to skin from brush or scrub.

**Dx:** Usually find adults, 3 to 7 mm, flat to bean shaped when engorged. Shades of brown (scutum darker than body), characteristic preanal groove on all stages. Nymphs look like small females.

**Habitat:** Skin.

**Similar Species:** *Dermacentor variabilis*. *Rhipicephalus sanguineus*.

**Range:** Eastern US, other species in western states.

**Clinical Signs:** Usually none, many can cause anemia.

**Comment:** May want to submit engorged ticks to diagnostic lab to see if infected with lyme disease organism. Vector of lyme disease and various ehrlichias.

**Potential Zoonosis:** No direct transmission of pathogens without attachment.

**Tx:** Removal – wash wound with alcohol.

### Spot Ons

Hartz® Advanced Care™ Brand Once-a-Month™ Flea and Tick Drops for cats and kittens (Phenothrin)

### Collars

Adams™ Dual Action Flea and Tick Collar for Cats (O-Isopropoxyphenyl methylcarbamate, 3-Phenoxybenzyl d-cis and trans 2,2,- dimethyl-3-(2-methylpropenyl) cyclopropanecarboxylate, N-Octyl bicycloheptene diacboximide)

Bansect® Flea and Tick Collars for cats (Naled)

Hartz® 2 in 1® Flea and Tick Collar for cats and kittens (Tetrachlorvinphos)

Longlife® 90 Day™ Brand Collar for cats (Tetrachlorvinphos)

Preventef® Flea and Tick Collars for cats (Diazinon)

Scratchex® Flea and Tick Collar for cats (Chlorpyrifos)

Vet-Kem® Breakaway® Plus Flea and Tick Collars for cats (Propoxur and (S)-Methoprene)





## LEISHMANIA SPP (CUTANEOUS)

Cutaneous leishmanial organisms (several different species) of the cat. Transmitted by sandfly bite.

**PPP=** Weeks to months.

**Dx:** Amastigotes in macrophages from impression smears.

**Habitat:**

Macrophages.

**Similar Species:**

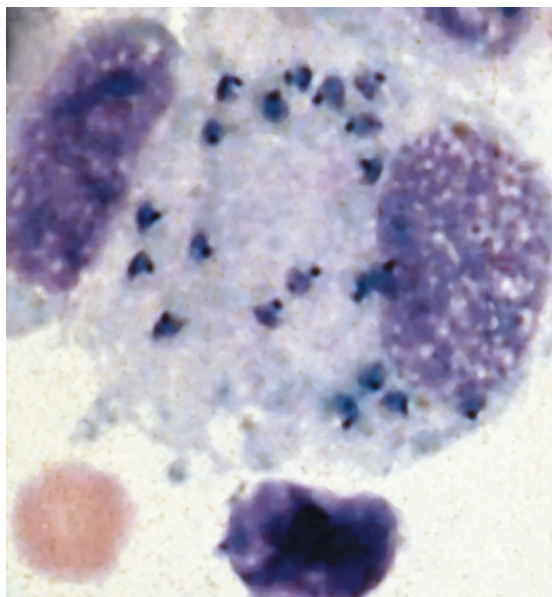
None.

**Range:** Mainly seen in cats located in central western United States, e.g., Oklahoma and Texas.

**Clinical Signs:**

Lesions often on ears and nose.

**Tx:** Surgical removal of lesions on ears has been curative. There have been no attempts at treatment with typical anti-leishmanial agents.





## LYNXACARUS RADOVSKYI

Hair-clasping mite of cats acquired by direct contact

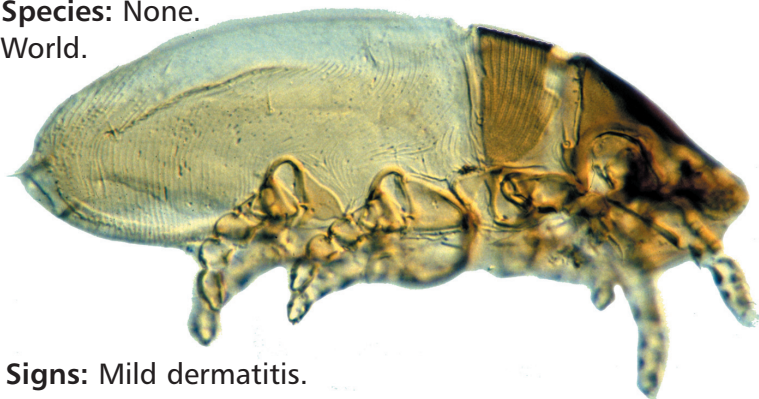
**Dx:** Mites seen on skin or fecal examinations. Mites (about 500  $\mu\text{m}$  long) are laterally compressed with a long abdomen.

Eggs (about 200  $\mu\text{m}$  long) typically glued to hairs.

**Adult Habitat:** Clasping to hairs typically in the tail region.

**Similar Species:** None.

**Range:** World.



**Clinical Signs:** Mild dermatitis.

**Tx:** No approved products, but these should work:

Defend® Just for Cats™ Insecticide (pyrethrin)

Frontline® Top Spot® for cats and kittens (fipronil)

Revolution™





## MESOCESTOIDES SPP

Tapeworm acquired by cats eating infected amphibians, reptiles, birds, or small mammals.

**PPP=** 3 weeks.

**Dx:** Segment in feces (250 to 500  $\mu$ m long); sometimes chains of segments are passed.

Small segments easily missed, but identified by the eggs being clustered in a single ball in the middle (about 30 or so eggs in the central packet. Each egg containing a larva that has 3 pairs of small hooklets).

Found in feces.

**Adult Habitat:** Small intestine.

### Similar Species:

*Mesocestoides* spp. described that could infect cats include *Mesocestoides kirbyi*, *M. latus*, *M. lineatus*, *M. litteratus*, and *M. manteri*.

All are very similar and are probably found naturally in various wild canids or felids.

**Range:** World.

### Clinical Signs:

Asymptomatic.

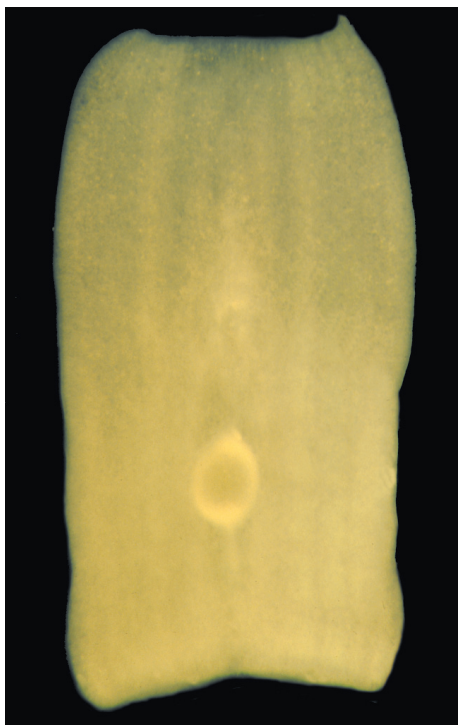
**Tx:** No approved drug. Praziquantel has been efficacious on more than one occasion at labeled dose. Epsiprantel (Cestex®) may also be effective.

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Cestex® (not for kittens <7 weeks)

Droncit® Feline Cestocide Tablets (not for kittens <6 weeks)

Droncit® Injectable Cestocide for dogs and cats (not for kittens <6 weeks)





## NOTOEDRES CATI

Mange mite of cats acquired by direct contact.

**Dx:** Mites in skin scrapings or fecal examinations. Mites (about 200 to 250  $\mu\text{m}$  long) have 8 legs and large stocky body spines. Terminal stalks on legs (I and II of females, and I, II, and IV of males; other legs terminate in setae) are long and unsegmented with sucker-like terminations. Egg about 200  $\mu\text{m}$  long.

**Adult Habitat:**

Burrows in skin.

**Similar Species:**

None.

**Range:** World.

**Clinical Signs:**

Pruritis, hyperkeratosis, alopecia, and self-inflicted trauma. Lesions typically begin on face or knees.

**Tx:** Avermectins probably the drug of choice. Revolution at labeled dose

probably very good for this infection:

Ivomec® (ivermectin 1% injection formulation: 0.2 mg/kg, SQ or PO once, repeat in 2 weeks)

Revolution™





## OTODECTES CYNOTIS

Ear mite of cats acquired by direct contact.

**Dx:** Mites in ear swabs or fecal examinations.

Mites (about 400  $\mu\text{m}$  long) have 8 rather long legs on a round body. Terminal stalks on legs (I and II of females, all legs of males; other legs terminate in setae) are short and unsegmented and end in sucker-like terminations. Eggs about 200  $\mu\text{m}$  long.

**Adult Habitat:** Ear canal.

**Similar Species:** None.

**Range:** World.

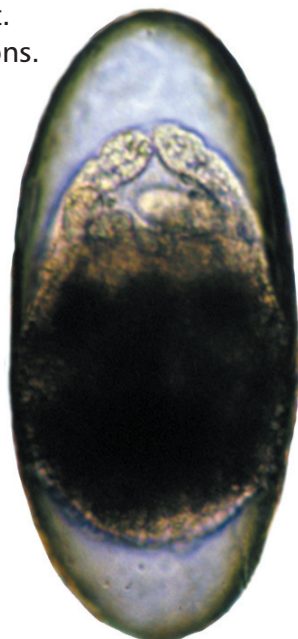
**Clinical Signs:** Otitis with head shaking, scratching at the ears, and production of cerumen. Can lead to severe secondary ear infections.

**Tx:** Several approved products work well in cats:

Acarexx™

Revolution™

Milbemite™





## PARAGONIMUS KELLICOTTI

Lung fluke of the cat acquired by eating infected crayfish or rodent hosts.

**PPP=** 5 to 7 weeks.

**Dx:** Eggs (70 to 100  $\mu\text{m}$  long) in feces or tracheal wash fluid are brown with seated operculum and a small bump on other end. Chest radiographs may show air-filled cysts or tissue densities (up to 1 cm) usually in the caudodorsal lung fields. Tracheal wash may contain eggs. Elevated eosinophil numbers.

**Adult Habitat:** Cysts in lungs.

**Similar Species:** A number of species reported from dogs and cats around the world. Eggs must be distinguished from *Spirometra* and *Diphyllobothrium*.

**Range:** *P. kellicotti* in North America, but other species around the world.

**Clinical Signs:** Usually asymptomatic. Main sign is coughing (mild to paroxysmal). Pneumothorax can occur if cysts rupture resulting in respiratory distress. Must differentiate from asthma, heartworm, cardiac disease, and *Aelurostrongylus* infection.

**Tx:** No approved drug. Praziquantel given at elevated dosages for several days is efficacious:

Droncit® Feline Cestocide Tablets (praziquantel; 25 mg/kg, PO, q8h for 3 days). Not for kittens <6 weeks.







## PEARSONEMA FELISCATI

Capillarid of feline bladder from ingesting eggs or possibly some undetermined paratenic host.

**PPP=** 2 months.

**Dx:** Egg in urine like *Trichuris vulpis*, but smaller (60  $\mu$ m long) with large surface pits.

**Adult Habitat:** Threaded through mucosa of urinary bladder wall.

**Similar Species:** None.

**Range:** World.

**Clinical Signs:** Asymptomatic. Very rarely, cats may present with post-renal obstruction.

**Tx:** No approved drug. After Tx, eggs may be passed in urine for several weeks after adults are killed. Potential therapy includes:

Ivomec® (ivermectin 1%  
injection formulation:  
0.2 mg/kg, SQ or PO, repeat  
in 2 weeks)







## PENTATRICHOMONAS HOMINIS

Trichomonad trophozoite of cats; fecal-oral transmission.

**PPP=** About 1 week.

**Dx:** Flagellated trophozoites (10  $\mu\text{m}$  long) in saline fecal preparation (destroyed typically by flotation media). Move with a jerking forward motion. Can often visualize an undulating membrane on one caught in debris.

**Habitat:** Lumen of cecum and colon.

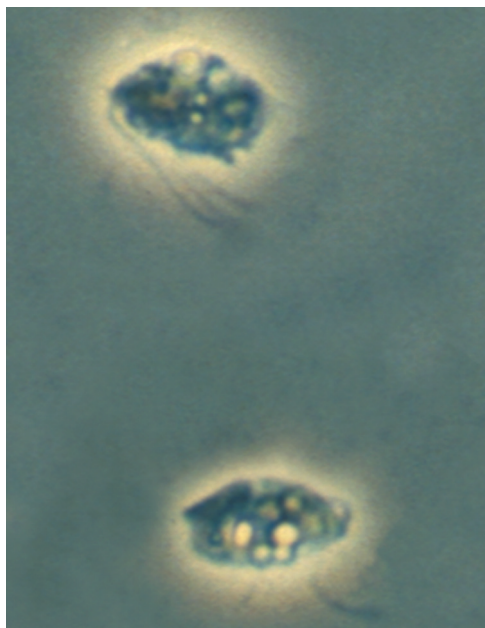
**Similar Species:** Need to distinguish trophozoite from that of *Giardia*.

**Range:** World.

**Clinical Signs:** Seen in cats with diarrhea; probably not typically the cause.

**Potential Zoonosis:** Could be directly transmissible from feces to human caregivers. Routine precautions should be taken when handling feline fecal matter.

**Tx:** No approved drug. Metronidazole has been used; Flagyl® oral tablets (metronidazole: 66 mg/kg, PO, q24h for 5 days).





## PHYSALOPTERA PRAEPUTIALIS

Feline stomach worm. Adults attach to antrum of stomach and proximal duodenum. Intermediate host: coprophagous beetles.

**PPP=** 2 to 3 months.

**Dx:** Egg (45  $\mu$ m long) slightly shorter than hookworm eggs, very clear, with a relatively thick shell containing a larva. Found in feces or in gastric lavage fluid at endoscopy. Lesions may be seen with gastric endoscopy.

### **Adult Habitat:**

Stomach and proximal small intestine.

### **Similar Species:**

*Physaloptera rara* (adults have no preputial-like sheath on the posterior end; believed a parasite of coyotes). Other species occur in other canines, cats, foxes, skunks, and raccoons.

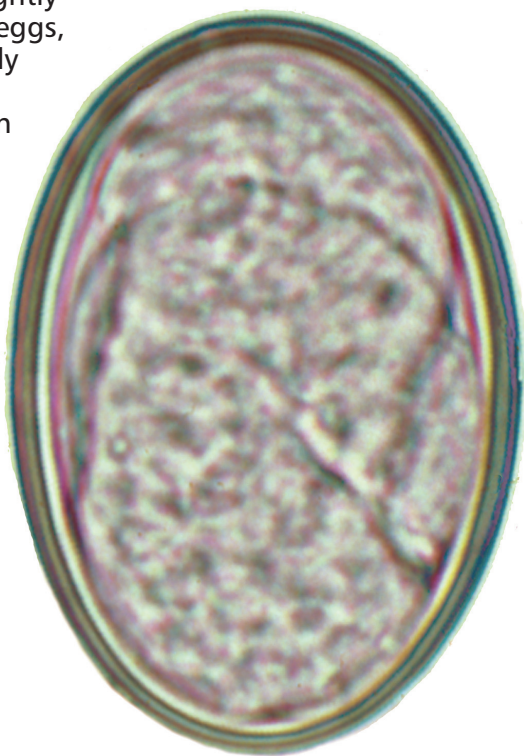
**Range:** World.

**Clinical Signs:** Vomiting.

**Tx:** No approved drug. Heartworm preventatives do not prevent infection.

Treatments appearing efficacious:

Ivomec<sup>®</sup> (ivermectin 1% injection formulation: 0.2 mg/kg, SQ or PO, repeat in 2 weeks)





## PHYSALOPTERA RARA

Feline stomach worm. Adults attach to antrum of stomach and proximal duodenum. Intermediate host: coprophagous beetles.

**PPP=** 2 to 3 months.

**Dx:** Egg (45  $\mu$ m long) slightly shorter than hookworm eggs, very clear, with a relatively thick shell containing a larva. Found in feces or gastric lavage fluid obtained during endoscopy.

**Adult Habitat:** Stomach and proximal small intestine.

**Similar Species:**

*Physaloptera praeputialis* (adults have a preputial-like sheath on the posterior end). Other species occur in other canines, cats, foxes, skunks, and raccoons.

**Range:** Mainly in the central United States.

**Clinical Signs:** Vomiting.

**Tx:** No approved drug. Heartworm preventatives do not prevent infection. Treatments appearing efficacious:

Ivomec® (ivermectin 1% injection  
formulation: 0.2 mg/kg, SQ or PO, repeat in 2 weeks)

Strongid®T (pyrantel pamoate 5 mg/kg, PO, 2 doses  
3 weeks apart)





## PLATYNOSOMUM CONCINNUM

Feline liver fluke acquired by ingesting lizards or amphibians.

**PPP=** 2 months.

**Dx:** Eggs (about 40  $\mu\text{m}$  long) in feces, small, dark, and operculate.

**Adult Habitat:** Bile ducts and gall bladder.

**Similar Species:** There are many flukes around the world that can occur in the bile ducts of cats.

**Range:** Southeastern United States.

**Clinical Signs:** Bile duct obstruction causing diarrhea, depression, anorexia, severe weight loss, various levels of jaundice (usually mild). Abdominal ultrasound reveals hepatic enlargement, dilated biliary tree, thickened bile ducts. Good images may show flukes within the bile ducts.

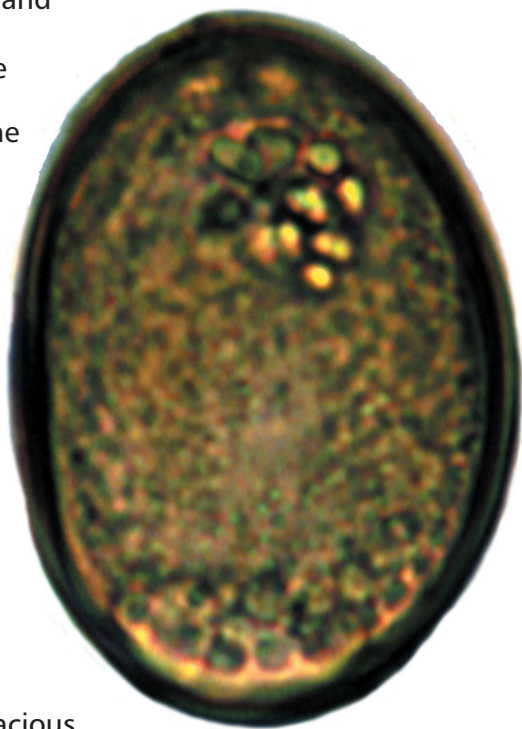
**Tx:** No approved drug.

Praziquantel may be efficacious.

High doses (40 mg/kg) in a debilitated cat could be fatal.

Droncit® Feline Cestocide Tablets (praziquantel; 20 mg/kg, PO, repeat in a month, and continue to check feces).

Not for kittens <6 weeks.







## RHIPICEPHALUS SANGUINEUS

Brown dog tick. Attach to skin from brush or scrub.

**Dx:** Usually find adults, 3 to 7 mm, flat to bean shaped when engorged. Shades of brown. Have eyes on edges of scutum. No preanal groove. Nymphs look like small females.

**Habitat:** Skin.

**Similar Species:** *Dermacentor variabilis*. *Ixodes scapularis*.

**Range:** Southern US; cannot stand freezing temperatures but do well inside.

**Clinical Signs:** Usually none; many can cause anemia. All stages (larva, nymph, and adult) feed on the dog. Can infest kennels and households. Probably want to consider protection of cats if area infested.

**Potential Zoonosis:** No direct transfer of pathogens without attachment.

**Tx:** Removal – wash wound with alcohol.

### Spot Ons

Hartz® Advanced Care™ Brand  
Once-a-Month™ Flea and Tick  
Drops for cats and kittens  
(Phenothrin)

### Collars

Adams™ Dual Action Flea and Tick  
Collar for Cats (O-Isopropoxyphenyl  
methylcarbamate, 3-Phenoxybenzyl  
d-cis and trans 2,2,- dimethyl-3-  
(2-methylpropenyl) cyclopropaneca-  
boxylate, N-Octyl bicycloheptene diacboximide)  
Bansect® Flea and Tick Collars for cats (Naled)  
Hartz® 2 in 1® Flea and Tick Collar for cats and kittens  
(Tetrachlorvinphos)andLonglife® 90 Day™ Brand Collar for  
cats (Tetrachlorvinphos)  
Preventef® Flea and Tick Collars for cats (Diazinon)  
Scratchex® Flea and Tick Collar for cats (Chlorpyrifos)  
Vet-Kem® Breakaway® Plus Flea and Tick Collars for cats  
(Propoxur and (S)-Methoprene)







## SARCOCYSTIS SPP

Sporocysts in feces of cats that have ingested muscle tissue of vertebrate intermediate host.

**PPP=** 3 days to 3 weeks.

**Dx:** Clear, sporulated, ellipsoid sporocyst in feces (9 to 17  $\mu$ m long), sometimes seen paired within thin oocyst wall; infectious when passed.

**Habitat:** Small intestinal mucosa.

**Similar Species:** This is a large genus with species infecting many different intermediate hosts. Sporocysts must be examined carefully to distinguish them from small oocysts and cysts of *Giardia felis*.

**Range:** World.

**Clinical Signs:** Asymptomatic.

**Potential Zoonosis:** Disease has been reported in people ingesting sporocysts; infectious cat feces should be handled with routine caution.

**Tx:** No approved drug.





## SPIROMETRA MANSONOIDES

Feline/canine tapeworm acquired by eating infected snakes, rodents, and other small vertebrates.

**PPP=** As short as 10 days; patency can be maintained for several years.

**Dx:** Eggs (60  $\mu$ m long) in feces about the size of *Ancylostoma caninum* egg, brown, elongate, with a small operculum on one end containing cells of the developing larva.

**Adult Habitat:** Small intestine.

**Similar Species:** There are a number of species of *Spirometra* around the world. Egg very similar to that of *Diphyllbothrium latum*.

**Range:** United States.

**Clinical Signs:** May have diarrhea, emaciation, and/or vomiting. Can produce non-regenerative anemia (sometimes severe).

**Tx:** No approved drug. Treatment with albendazole unsuccessful. Some report success treating with the routine praziquantel (5 mg/kg), but others report the need for elevated doses. Epsiprantel (Cestex®) may also be effective.

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Cestex® (not for kittens <7 weeks)

Droncit® Feline Cestocide Tablets (not for kittens <6 weeks)

Droncit® Injectable Cestocide for Dogs and Cats (not for kittens <6 weeks)

If treatment is unsuccessful, try

Droncit® Feline Cestocide Tablets (praziquantel 7.5 mg/kg x 2 days or 25 mg/kg x 2 days). Not for kittens <6 weeks.





## TAENIA TAENIAEFORMIS

Rodent tapeworm. Cats acquire infection by eating rodent viscera.

**PPP=** 1 to 2 months.

**Dx:** Find segments (500 to 1000  $\mu\text{m}$  long) or taeniid eggs (30 to 35  $\mu\text{m}$  long) in feces. Segment recognized by rectangular appearance with single lateral reproductive pore. Can tease apart segment to reveal typical eggs.

**Adult Habitat:** Small intestine.

**Similar Species:** Only *Taenia* of the domestic cat, but the eggs of *Taenia* are indistinguishable from those of *Echinococcus*.

**Range:** World.

**Clinical Signs:**

Asymptomatic.

**Tx:** Very effective approved products:

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Cestex® (not for kittens <7 weeks old)

Droncit® Feline Cestocide Tablets (not for kittens <6 weeks old)

Droncit® Injectable Cestocide for Dogs and Cats (not for kittens <6 weeks old)





## TOXASCARIS LEONINA

Common roundworm of cats (and dogs). Typically not seen in kittens (no prenatal infection).

**PPP**= 2 months.

**Dx:** Egg (ovoid, 90  $\mu$ m long) in feces has thick, smooth shell with the internal ovum appearing light in color. Eggs develop rapidly.

**Adult Habitat:** Small intestine.

### Similar Species:

*Toxocara cati*: similar size and shape, but has dimpled eggshell and a darker colored ovum.

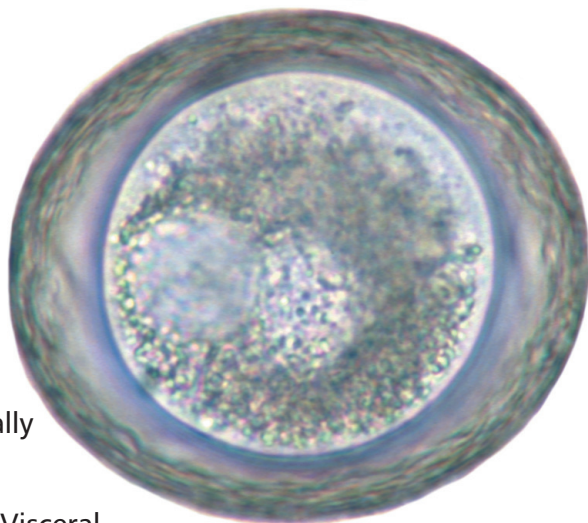
**Range:** World, but more common in cooler climates.

**Clinical Signs:** Typically none. Only very rare reports of disease.

**Potential Zoonosis:** Visceral larva migrans in children.

**Tx:** Several OTC products also efficacious; **products labeled for *Toxocara cati* are probably efficacious.**

Task<sup>®</sup> Tabs (not for kittens <10 days or 1 lb)







## TOXOCARA CATI

Common feline roundworm. Kittens can acquire worms in milk from queen.

**PPP=** Kittens begin shedding eggs as early as 3 to 4 weeks after birth.

**Dx:** Eggs (spheroid, 80  $\mu$ m long) in feces of cats of all ages. Eggshell has a characteristic pitted surface.

**Adult Habitat:** Small intestine.

**Similar Species:** The egg of *Toxascaris leonina* is slightly larger but has a smooth shell, and the ovum tends to be lighter in color.

**Range:** World.

**Clinical Signs:** Typically asymptomatic. Kittens may be listless and inappetent.

**Potential Zoonosis:** Visceral and ocular larva migrans in children.

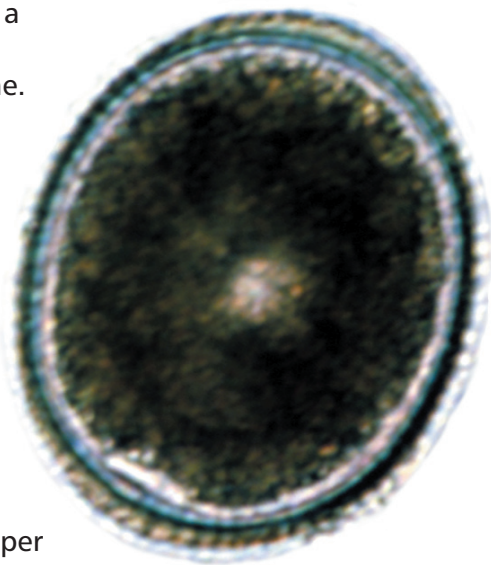
**Tx:** Several products used as per label instructions:

Drontal® Tablets (not for kittens <4 weeks or 1.5 lbs)

Revolution™ (not for kittens <6 weeks)

Task® Tabs (not for kittens <10 days or 1 lb)

Interceptor® Flavor Tabs (not for kittens <6 weeks or 1.5 lbs)





## TOXOPLASMA GONDII

Small-sized feline coccidian acquired by eating oocyst or infected meat of bird or mammal.

**PPP=** 3 to 18 days; longer when infection via eating of oocyst.

**Dx:** Oocysts (11 to 13  $\mu\text{m}$  long) in feces, clear, unsporulated spheroid.

**Habitat:** Small intestinal mucosa.

**Similar Species:** Cannot distinguish oocyst from that of *Hammondia hammondi*.

**Range:** World.

**Clinical Signs:** Intestinal infection usually asymptomatic. Cats can develop severe generalized disease and ocular lesions; such disease not necessarily related to shedding of oocysts in feces.

**Potential Zoonosis:** Oocysts not infectious when passed in feces, but sporulate rapidly (24 hours) under appropriate conditions. Thus, cats shedding oocysts morphologically consistent with *Toxoplasma gondii* should either be housed in clinic to protect client or started on treatment to try and reduce shedding.

**Tx:** Once oocysts appear in feces, most of the damage from development in the mucosa has already occurred. Sulfonamides are the drugs of choice:

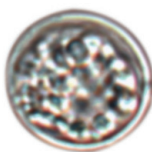
Tribissen® tablets (sulfadiazine–trimethoprim; 15–50 mg sulfadiazine plus 5–10 mg trimethoprim/kg, PO, q12h for 6 days; cats over 4 kg)

Albon® (sulfadimethoxine; 50 mg/kg, PO, once, then 27.5 mg/kg, PO, q24h until signs disappear)

Primor® (sulfadimethoxine–ormetoprim; 55 mg sulfadimethoxine plus 11 mg ormetoprim/kg, PO, q24h for up to 23 days)

Corid® 1.25% oral crumbles, 9.6% solution, 20% soluble powder (amprolium 300 to 400 mg/kg, PO, q24h for 5 days; 110–220 mg/kg for 7–12 days; 20–40 mg/kg for 10 days)

Antirobe® tablets or oral solution (clindamycin; oocysts in feces: 25–50 mg/kg, PO, q24h for 7–14 days. Systemic: 8–16 mg/kg, SQ or PO, q8h for 14–28 days, or 12.5–25 mg/kg, SQ or PO, q12h for 14 to 28 days)



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