It is a real pleasure to introduce Parasit’Xpert, a newsletter that is devoted to you who are willing to be updated with emerging and re-emerging cat and dog parasites, diagnostic tips, treatment solutions and many other interesting infos. Parasitism as a unique life style is shared by parasites that are fascinating creatures. They are uniquely adapted to survive, in some cases through very complex life cycles. There’s also research to suggest that some may even change the behavior of hosts to assist them in their quest to reproduce. In further months we will continue to bring you new and exciting research on cat and dog parasites. At the same time, we will offer you a bit of insight into the scientific process, and how knowledge about them grows over time. We also hope that you will enjoy a bimonthly dose of advice on parasite control and communication tips with your clients too. Finally, a big appreciation to all of you who will read and share these informations as well as give us precious comments.

Special thanks to: dr. sc Silvija Rakočević, dr.sc Tatjana Šoban, prof Emanuele Brianti and dr. sc. Luigi Venco.

EDITORIAL

Cat Lungworm

Dr. sc. Rakočević described the case about a privately-owned cat of 10 months that very concerned owner brought to her clinic few weeks ago. The owner was concerned due to constant and quite heavy respiratory signs. At the Clinic the cat showed intense coughing, sneezing, mucopurulent nasal discharge and severe dyspnea. After thorough examination blood sample was taken for blood cell count and basic hematological parameters. Normal values were obtained except the higher level of eosinophils (15%). The laryngeal swab for onsite citology showed clusters of eosinophils as well. The lungs were further radiographed to assess the lung pathology. Radiographic changes were characterized by bronchial and interstitial patterns. Besides other pathological entities, but also according to the presence of eosinophils in the laryngeal swab she also included a lungworm infection into the differential diagnostics. Therefore she took some feces to prepare a direct fecal sample smear. In order to get the right diagnosis she also asked the owner to deliver further fecal samples to the Dept of Parasitology at the Faculty of Veterinary Medicine in Zagreb, where an infection with *Aelurostrongylus abstrusus* was confirmed by the Baermann method. The larvae were approximately long 330 μm with a characteristic tail morphology. Once she got the right diagnosis she decided to treat the cat with higher dosage of ivermectin waiting for a product with a claim.

ABOUT THE CAT LUNGWORM

*Aelurostrongylus abstrusus*, the lung worm of cats is a nematode (that usually do not exceed 10 mm in length) that has a complex life cycle. The eggs are eaten by slugs or snails, these in turn are eaten by birds or rodents that are then eaten by cats. Once ingested the larvae migrate from the gut to the lungs where live in respiratory bronchioles, alveolar ducts and pulmonary alveoli. Symptoms are coughing, sneezing and severe nasal discharge.
It is suggested that despite case histories of human infection in the literature, historical factors have led to *Toxocara cati* being under-recognized as a zoonosis particularly when compared with *Toxocara canis*. Studies excluding strays cited 8% of cats with *Toxocara cati* while another study including strays found 42% of cats had the parasite.

*Toxocara cati* is a roundworm that occurs worldwide in cats. Transmission usually occurs via ingestion of eggs, which are passed in feces. Once swallowed, the larvae hatch and start a fantastic route from the intestine to the liver and lungs, via the blood stream, where they are coughed up, swallowed again and mature. Cat lovers can become infected and characteristic larval wandering can provoke a serious disease.

**About the parasite**

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**IMPORTANT TO KNOW**

**Who can get infection with *Toxocara cati***?

Anyone, but certainly at higher risks are children, people who accidentally eat soil or sand accidentally contaminated with eggs.

**What are the symptoms of infection?**

Toxocariasis is a serious disease. People may have fever, problems with breathing and stomach pain, sometimes vision problems. Approximately 13.9% of the U.S. population has antibodies to *Toxocara*. This suggests that tens of millions of Americans may have been exposed to the *Toxocara* parasite.

**Scientific approach**

Human infection is caused by larval stages invading musculature, brain and the eye, and immune mechanisms appear to be ineffective at eliminating the infection. Survival of *Toxocara* larvae can be attributed to two molecular strategies evolved by the parasite. Firstly, it releases quantities of ‘excretory-secretory’ products that interact with and modulate host immunity. The second strategy is the elaboration of a specialised mucin-rich surface coat; this is loosely attached to the parasite epicuticle in a fashion that permits rapid escape when host antibodies and cells adhere.
**Giardia duodenalis** is a common protozoan parasite that colonizes the small intestine of a variety of domestic and wild animals. In cats it represents one of the most common parasite with reported worldwide prevalence from 2 to 10% with the higher percentages reported from symptomatic animals. Instead of a fact that a combination of several tests is recommended for accurate diagnosis, practitioners usually use a native smear especially with diarrhoeic feces. In that case, right recognition of the mobile trophozoites is crucial especially because similar clinical signs can be also provoked by chronic infection with another flagellate, *Tritrichomonas foetus* (*Tritrichomonas blagburni*). The infection with *Tritrichomonas foetus* (*Tritrichomonas blagburni*) is regarded as one of the most common infectious causes of colitis in the domestic cat. The infection is common in catteries and shelters, and while remission of diarrhea may occur over time, persistence of infection is common. In the native smear the movement of the *Giardia* trophozoites is a tumbling leaf-like motility using four pairs of flagella for locomotion. Trichomonads swim with a characteristically wobbly movement which makes them unmistakable.

**Golden rules to prevent *Giardia* infection in dogs and cats**
- clean and dry the surfaces
- maintain personal hygiene to avoid spreading cysts
- on site test all animals before introduction
- quarantine and properly diagnose diarrhoeic animal

**How to treat *Giardia* infection in dogs and cats**
- 50mg/kg once daily for 5 days or combination of 15mg/kg febantel, 14.4 mg/kg pyrantel and 5.0 mg/kg praziquantel once daily for 3 days

**How to prevent *Tritrichomonas* infection in cats**
- keep surfaces clean and dry
- replace litter and disinfect boxes during treatment

**How to treat *Tritrichomonas* infection in cats**
- no drugs against *Tritrichomonas* are registered for cats, ronidazole (30 mg/kg twice daily for 2 weeks) can be off label used with some success (cats must be closely monitored for neurotoxicity)
**Dirofilaria immitis:**
The Truth About the Worm in Cats

Cats in comparison with dogs are much less susceptible hosts of heartworms, and microfilaremia is not common (usually found in about 2% of cases). When present, microfilaremia is inconsistent and short-lived. Some cats appear to be able to rid themselves of the infection spontaneously since they are able to develop a strong immune response. From field studies we know that the prevalence of infection in cats is about 10% of the prevalence in dogs in the same area. About 50% of cats stay completely asymptomatic till spontaneous self cure, while 25% of the infected cats are going to show acute respiratory distress responding to therapy, and 25% die suddenly or show hyperacute symptoms. Cats typically have fewer and smaller worms than dogs and the life span of worms is shorter, approximately two to three years, significantly less than in dogs (life span in dogs is five to seven years). After experimental infections in cats, the percentage of worms developing into the adult stage is lower than in dogs (75%).

**Toxoplasma gondii:**
An Endless Saga About Cats and Their Victims

Blame it on the cat. Or the raw meat. Exposure to either can result in infection with *Toxoplasma gondii*. This intracellular parasite doesn’t show many symptoms in its host. Immuno-compromised patients and fetuses of pregnant women who become infected can be at high risk from very serious complications. Infected mice with *Toxoplasma gondii* lose their fear of cats, which is good for both cats and the parasite, because the cat gets an easy meal and the parasite gets into the cat’s intestinal track - the only place it can sexually reproduce and continue its cycle of infection. New research by graduate student Wendy Ingram at the University of California, Berkeley, reveals a scary twist to this scenario: the parasite’s effect seem to be permanent. The fearless behavior in mice persists long after the mouse recovers from the flu-like symptoms of toxoplasmosis, and for months after the parasitic infection is cleared from the body.
Troglostrongylus brevior and T. subcrenatus are metastroglyoids (lungworms of a cat). Some reports suggest that in certain conditions T. brevior, other more common metastroglyoid Aelurostrongylus abstrusus as Capilaria aerophila live in sympatry. Although a small number of clinical descriptions has been published so far, Prof. Emanuele Brianti from the University of Messina showed that respiratory signs in cats infected with Troglostrongylus are severe and that the infection has been often fatal in kittens. The diagnosis of aelurostrongylosis and troglostrongylosis relies on the identification of first stage larvae upon Baermann examination. L1s of A. abstrusus are 330-400 μm long and their tail is S shaped with dorsal and ventral incisures and an evident knob-like projection. The tail of T. brevior is S shape with dorsal and ventral incisures. Troglostrongylus brevior lacks the kink present in A. abstrusus (picture on the left).
### Tapeworms of cats

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<th>TAPEWORM SPECIES</th>
<th>PRE-PATENT PERIOD</th>
<th>PATENT PERIOD</th>
<th>INFECTIVE STAGES AND ROUTE OF INFECTION</th>
<th>DISTRIBUTION IN EUROPE</th>
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<td>Taenia taeniaeformis</td>
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<td>Several years</td>
<td>Ingestion of larvae in rodents</td>
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<td>Echinococcus multilocularis</td>
<td>28 days</td>
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<td>Ingestion of larval stages in intermediate hosts (rodents)</td>
<td>Central and Eastern Europe, Italy, Turkey</td>
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From ESACC Guideline

### LIFE CYCLE OF DIPYDIDUM CANINUM

The Double-Pored Dog Tapeworm (*Dipylidium caninum*) mainly infects dogs and cats, but is occasionally found in humans. Gravid proglottids are passed intact in the feces from the definitive host or emerge from the perianal region of the host. Subsequently, these proglottids release typical egg packets. On rare occasions, proglottids rupture and egg packets are seen in stool samples. Following ingestion of an egg by an intermediate host (larval stages of the Dog or Cat Flea, *Ctenocephalides spp.*), an oncosphere is released into the intermediate host’s intestine. The oncosphere penetrates the intestinal wall, invades the insect’s hemocoel (body cavity), and develops into a cysticercoid larva. The larva develops into an adult and the adult flea harbors the infective cysticercoid. The vertebrate host becomes infected by ingesting an adult flea containing a cysticercoid. The proglottids mature, become gravid, detach from the tapeworm, and migrate to the anus or are passed in the stool, bringing the life cycle full circle.

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**Taenia taeniaeformis**

This tapeworm is rarely associated with clinical signs in the dog or cat. Although the mature segments leaving the anus may result in anal irritation and cause an animal to rub its bottom along the ground. This species uses rodents as intermediate hosts.

**Echinococcus multilocularis**

Cats, in contrast to dogs, are epidemiologically insignificant as sources of egg output as they are poor hosts for this worm. Instead of a small risk it is important to treat cats in high risk situations.

**Mesocestoides spp.**

This tapeworm can be found also in cats beside dogs. It has an indirect life cycle that requires at least two intermediate hosts. The first intermediate host is unknown (although it is supposed to be ants, beetles, oribatid mites), but many vertebrates can serve as a final intermediate host harboring larval tapeworms (*tetrathyridium*) within body cavities, including snakes, birds, lizards and rodents.