# Cat Parasites: Types, Transmission & Life Cycles

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A parasite is regarded as an organism that derives nourishment by feeding on or within another animal. The most noted parasites in cats and dogs are 'worms' and that is because the majority of all kittens and puppies acquire intestinal worms either prior to or shortly after birth. Worms are only part of the parasite picture, however, as many non-worm parasites exist as well. Common parasites include fleas, flies, ticks, lice, and mites as well as worms and other intestinal parasites.

All parasites of concern can result in damage to an animal's health. Similarly, some can be transferred from the cat or dog to other household animals including humans. No cat or dog that is parasitized is considered healthy.

If you would like a better understanding of parasites, this article is for you.

What are parasites?

You have heard of stowaways on ships. They slyly sneak on board, find a secret place where they can live, steal food, and then eventually jump ship. Parasites are much like stowaways. They get on or in a host, move to where they want to be, gain nourishment, warmth, and other amenities, and then they or their offspring leave the host to find another. In a broad sense, a *parasitic* relationship is defined as one in which one organism (the parasite) lives on or within the other (host), and may cause the host harm. Before we go on, let us take a step back and look at how this relationship differs from others in which different organisms live together.

How do different species relate in nature?

In nature, we are familiar with all types of relationships between different species. Some help each other; others harm or even kill the other.

Mutualism: In a relationship called *mutualism*, both organisms benefit. It is a win-win situation. Examples include the tickbird in Africa which rides on the back of elephants and eats the flies or ticks that are there. The tickbird gets a good meal, and the elephant gets rid of those pesky flies and ticks. Lichens are another example. Lichens are really very close relationships between fungi and algae. They need to be together in order to live.

Commensalism: Another type of relationship is called *commensalism*. This is a relationship in which one organism benefits, and the other neither benefits nor is harmed. Think of a hitchhiker. An example in nature would be the relationship between a remora and a shark. The remora attaches itself to the underside of the shark. This does not hurt or benefit the shark, but the remora gets free meals by eating the scraps of food left over from the shark's dinner. When you think about it, another benefit is that when you are attached to the shark, you can hardly become its dinner.

Predator-prey: Now we get to the win-lose relationships. In a *predator-prey* relationship, one organism quickly (or in the case of a cat with a mouse, not so quickly) kills the other. This is a win-lose relationship. Examples would include a cat and mouse, the fisherman and the trout, or a spider and its captured flies.

Parasite: The definition of *parasite* depends on whom you talk to. As we stated above, the broad definition of a parasite is any organism that is dependent on another (the host) for room and board, and does not necessarily cause the host any harm. Some scientists and veterinarians prefer to use the term *parasite* to mean a close relationship in which one organism harms the other while obtaining what it needs to live - basically a win-lose situation that takes more time to develop. In the following discussion, that is the definition we will be using.

Although a parasite may harm a host, it does not usually kill the host or it would eventually run out of a place to live. Parasites generally gain food from the host, but they also need a way to reproduce and get from one host to another. So the next topics we need to talk about are life cycles and transmission of parasites.

Life cycles and transmission of parasites

Basically, a life cycle describes how an organism develops from the immature stage to the adult. Some animals produce live young and others produce eggs. The same is true of parasites. In addition, there are some one-celled parasites that reproduce by dividing into two identical parts.

Direct Life Cycle: There are two general types of life cycles. In a *direct life cycle*, the immature form of the parasite can infect the same host it came from. For instance, the adult parasite lives in the host's intestine, lays eggs which are passed in the stool, and the eggs can infect the same or similar host. Roundworms have a direct life cycle.

Indirect Life Cycle: In an *indirect life cycle*, the immature form must pass through a different type of host before it can re-enter and infect the host it came from. An example would be heartworms. The adult worm lives in the cat or dog. The immature form, laid by the adult heartworm, is taken up by the mosquito. The immature form develops within the mosquito, and is then reintroduced into another cat or dog where it develops into the mature adult and the cycle repeats itself. The host in which the immature form of the parasite lives is called the *intermediate host*, in this case, the mosquito. The host in which the adult form lives is called the *definitive host*.

Transport Hosts: Some life cycles incorporate what is called a *transport host*. It is a special kind of intermediate host in which no development of the immature parasite occurs. The transport host is really a way for the immature parasite to get from one



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mammalian host to another. The parasite does not develop within the transport host, but is just transferred from one host to another. Rodents can be transport hosts for the roundworms of cats and dogs.

Many parasites have life cycles that include a phase of migrating through the body, often from the digestive system to the lungs or other organs such as roundworms. Others, including hookworms and heartworms migrate from their entrance through the skin to other organs.

Aberrant Parasites: Most parasites are host-specific, which means they only infect and live in certain animals. If they enter the wrong animal, or host, they may not survive or they may migrate abnormally. When a parasite enters the wrong host it is said to be *aberrant*. Often, aberrant parasites will cause an over-reaction in the body of this wrong host and serious disease can result.

Zoonoses: Infections that can be passed from animals to humans are called zoonotic diseases, or *zoonoses*. There are many parasites that fit this category. For some parasitic zoonoses, humans will have the same symptoms as a cat or dog. In others, because the parasite is aberrant, the symptoms may be very different because the parasite affects different organs or the human body reacts differently. Roundworms, hookworms, and *Toxoplasma* are all zoonoses.

Prepatent Period: There is one more term related to life cycles that we would like you to be familiar with. That is the *prepatent p prepatent period* This is the time interval between when the parasite enters the host and the subsequent form of the parasite can be recovered from the host. For example, the prepatent period for heartworms is 6 months. It takes 6 months from the time the immature forms enter the body through a mosquito bite, and the presence of heartworms in the heart. For many parasites, the prepatent period is close to the time between the point when the animal became infected and when we can diagnose the infection. The prepatent period for whipworms is three months, i.e., it takes three months from the ingestion of the eggs until the adult worms are in the intestine (and soon laying their own eggs).

You may have heard of a time interval called the *incubation period*. This represents the time from when the parasite enters the host and the development of signs or symptoms of disease. The incubation period is usually longer than the prepatent period. For instance, the prepatent period for heartworms is 6 months, but infected animals may not become ill for a year or more after that fateful mosquito bite.

Living arrangements of parasites

Parasites can get on a host and remain 'on deck.' These are called *ectoparasites* (ecto=outside). Examples of ectoparasites are fleas and ticks. Other parasites move to the inner cabins of the host and are called *endoparasites* (endo=in). Roundworms, heartworms, and tapeworms are examples of endoparasites.

Obligatory Parasites: By definition, a parasite must live on a host sometime during its life or it would not be a parasite. Parasites differ, however, in how much of their lives they spend on their hosts. *Obligatory* parasites live on a host all the time. They cannot live and reproduce free in the environment. Heartworms are obligatory parasites – they either have to be in a mammal or a mosquito to live. Most parasites of cats and dogs are obligatory parasites. The reproductive forms e.g.; eggs of obligatory parasites can sometimes live for long periods of time outside of a host, as in the case of roundworms. But these reproductive forms are dormant, and can do nothing until they get into a new host.

Periodic Parasites: Other parasites are called *periodic* parasites. They live part of their lives on a host, and part of it off. These guys keep jumping on and off ships throughout their lives. Ticks are a good example of periodic parasites. They get on an animal to eat, but then they detach themselves when they are done eating – they 'eat and run (detach, really).'

Facultative Parasites: There are other parasites that can actually eat, sleep, and lay eggs while off of the host. These are *facultati facultative* parasites. When they are not on a host we call them 'free-living.' When a host comes around, they will take advantage of a change of scenery and live on the host a while. *Pelodera strongyloides* is an example of a facultative parasite. It normally lives in the soil, being especially fond of moist, decaying organic matter such as bedding. When a dog lies down on the bedding, *P. strongyloides* invades the upper layers of skin and can cause a severe inflammation.

Classifying parasites

Now that we have possibly overwhelmed you with all of the different ways parasites can be classified, we will add one more. This classification really takes all the characteristics we described above, as well as anatomic features and uses them to organize the parasites by their similarities. This classification system is also used for plants and larger animals. You probably remember it from biology class. It is called the Linnaean classification scheme.

'Kingdom' is the most general category, and the categories get more specific until we reach 'Species' (there is actually a more specific classification after that called 'Variety'). The classifications of some more well known organisms are shown below:

| | **Cat** | **Cat Flea** | **Cat Hookworm** | **Cat Roundworm** | **Toxoplasma** |
|---|---|---|---|---|---|
| **Kingdom** | Animalia | Animalia | Animalia | Animalia | Protista |
| **Phylum** | Chordata | Arthropoda | Aschelminths | Aschelminths | Protozoa |



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| | | | | | |
|---|---|---|---|---|---|
| **Class** | Mammalia | Insecta | Nematode | Nematode | Sporozoae |
| **Order** | Carnivora | Siphonaptera | Strongylida | Ascaridida | Eucoccidiidae |
| **Family** | Felidae | | Ancylostomatidae | Ascarididae | Sarcocystidae |
| **Genus and Species** | Felis catus | Ctenocephalides felis | Ancylostoma tubaeforme | Toxocara cati | Toxoplasma gondii |

We can see that of those organisms listed, the cat hookworms and the roundworms are most closely related to each other. They have the same kingdom, phylum, and class. *Toxoplasma gondii* is the most different from the rest – it is not even in the same kingdom as the others.

It is customary to place the *genus* and *species* in italics or quote marks (" "). Once the genus has been specified in a text, it is often only indicated by its first letter in later text. For instance, *Toxocara cati* is referred to as *T. cati*.

Major classes of parasites

Helminths: The term 'helminths' is a kind of generic word for 'worm.' It comes from the Greek 'helmins' which means 'worm.' The term is used to group certain parasites together and includes the Nematodes, which are long, cylindrical worms, tapeworms, and flukes. You have maybe heard of medications to treat infestations with worms called 'antihelmintics.' This group of drugs is literally 'against helminths.' Let us take a look at the various helminths.

Nematodes: In general, Nematodes are round in cross-section, are longer than they are wide, and are unsegmented. They come in many sizes, from microscopic to a yard in length. Nematodes are a significant cause of disease in cats and dogs. For every organ system in the body, there is probably a nematode that lives there, or at least passes through. Though they are in the same Class, Nematodes have extremely varied life cycles. Some require intermediate hosts and some are facultative parasites. Some lay eggs and others bear live larvae.

The Class 'Nematodes' is sometimes referred to as 'Roundworms.' This can be a bit confusing since we often use the term 'roundworm' when we are talking about the spaghetti-like intestinal worms of cats and dogs. The cat and dog roundworms are 'Roundworms' but not all 'Roundworms' are cat and dog roundworms. As a matter of fact, there are hundreds of 'Roundworms' or Nematodes.

Tapeworms: Tapeworms are flat worms that are segmented. They consist of a head, neck, and then a number of segments. The head usually has suckers or muscular grooves that enable it to attach itself to the animal's intestine.

Each tapeworm segment has its own reproductive organs. New segments are continually formed in the neck region while those at the end of the tapeworm are cast off as they mature. These mature segments are really egg packets. The segments may often be seen near the anus of the cat or dog. These segments may move if recently passed, or if dried, they look like grains of uncooked rice or cucumber seeds. Tapeworm infections are usually diagnosed by finding these segments on the animal.

Tapeworms of cats and dogs all have life cycles that include an intermediate host. These hosts include fleas, fish, and domestic animals such as sheep and pigs. All of these tapeworms live in the cat's or dog's digestive system. It is interesting that tapeworms have no digestive systems themselves, but absorbnutrients through their skin.

Flukes: Flukes are flat, leaf-shaped, unsegmented worms that look similar to leeches. Flukes have suckers, hooks, or clamp-like appendages with which they attach themselves to the host's organs. Flukes that infest cats and dogs vary in size from ½ millimeters (less than 2/100 of an inch) to almost ½ inch. Fluke eggs have a unique characteristic - the shell around the egg has a trap door called an operculum.

The flukes that infect cats and dogs have indirect life cycles. The intermediate hosts differ quite a bit, from lizards, to fish, to snails. In general, flukes do not cause serious disease in cats and dogs unless they are present in very high numbers.

Arthropods: The term *arthropod* means joint-foot and refers to the fact that all members of this phylum have jointed legs. The two classes that include parasites of cats and dogs are Insects and Arachnids. Other classes include the Crustaceans with members such as crayfish and lobsters, and the class Myriapoda to which millipedes and centipedes belong. The phylum of Arthropods also includes a group of organisms that nobody seems to be able to categorize. These are the pentasomes, one of which is a parasite of cats and dogs. Let us take a closer look at the parasitic arthropods.

Insects: Insects make up 70% of all known species of animals of all kinds, so it comes as no surprise that some of them are parasites. When we think of insects, we tend to think of flies and mosquitoes – pests. But insects can be more than just pests; they can be the cause of severe disease since the class of Insects also includes lice and fleas.

Insects can be a threat to the health of animals through a number of different mechanisms. Take fleas for example. They are parasites. They can serve as intermediate hosts for other parasites (the fish tapeworm). They can also serve as vectors (carriers) of diseases like bubonic plague. Still other insects have poisonous bites such as bees and wasps.

Insects have antennae, compound eyes, and a body composed of head, thorax, and abdomen. Many insects have wings, though



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in some insects these wings are so small they are more like stabilizers. Fleas are actually wingless insects, though they do have a mustache.

Arachnids: When we think of arachnids we often first think of spiders. But spiders have some pretty nasty cousins including ticks and mites. As a Class, Arachnids are carnivorous animals. Some, such as various species of lice feed on the tissue fluids of other animals through a sucking apparatus. Some mites eat portions of other animals through the use of their front legs that may have suckers or hooks. And as we remember from biology class, arachnids have eight legs as adults, not six like the insects.

Protozoa: Now we come to the last large group of parasites. These are the one-celled organisms called Protozoa. They are microscopic and were first discovered by the man who actually invented the microscope, Anton van Leeuwenhoek. There are over 45,000 species of Protozoa. They cover the globe and are responsible for millions of cases of disease in both humans and animals.

Protozoa have two main parts – the nucleus and the cytoplasm. They are surrounded by a non-rigid membrane and have various means of locomotion. Some Protozoa, such as *Giardia cati* and *Giardia canis*, move about with the assistance of flagella. Flagella are long, hair-like structures that can whip back and forth rapidly, propelling the organism. Other Protozoa move about through the use of cilia. Cilia are much shorter hair-like structures that often cover the organism. *Balantidium coli* has numerous cilia with which it moves. Some Protozoa, like *Toxoplasma gondii*, move about through gliding motions without the aid of appendages.

The various types of parasites of cats and dogs are described in detail in individual articles on our site. If you would like an alphabetical listing, **click here**.



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