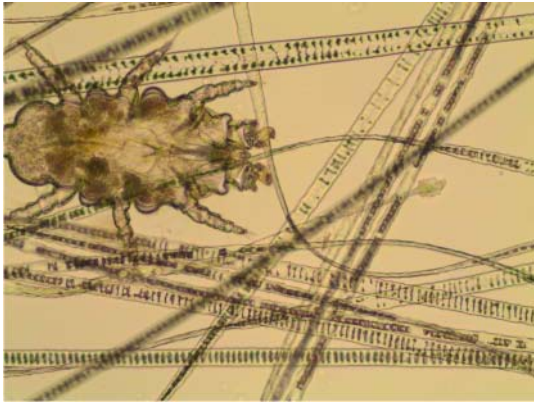
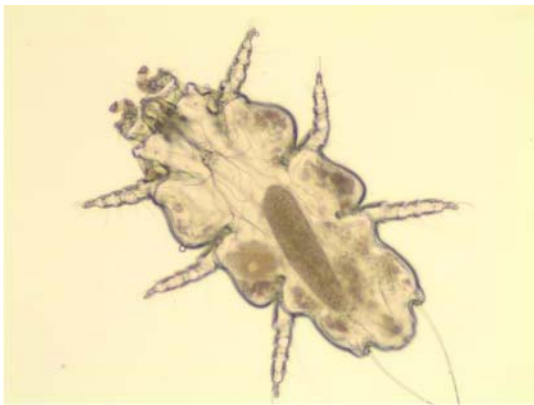


## Ectoparasites

Fleas, ticks, and lice are uncommon in modern laboratory facilities, but may be seen on wild or feral rodents. Most ectoparasite infestations seen in rats and mice used for research are various species of mites. Mixed infestations are possible.



***Myobia musculi***: Females are approximately 400  $\mu$  to 500  $\mu$  long and 200 to 250  $\mu$ m wide, while males are approximately 285  $\mu$  to 320  $\mu$  long and 140 to 160  $\mu$ m wide. Females and males are very similar in appearance. The lateral margin of the posterior body forms bulges between each pair of legs. The first pair of legs is located at the cranial end of the mite and the short, stubby legs are highly adapted for grasping hairs. The other three pairs of legs are less modified; each tarsus ends in a large, claw-like structure, the empodial claw. *Myobia* resembles *Radfordia* and is distinguished by the single empodial claw. Eggs are oval, 200 - 250  $\mu$  long, and are attached to the bases of hairs at their lower poles.



***Radfordia affinis***: Although this is considered a mouse fur mite, it can infest both mice and rats. Morphologically, this mite is very similar to *Myobia musculi* in both size and biology. The two can be distinguished by examination of the tarsal terminus of the second pair of legs. *Radfordia affinis* has two tarsal claws of unequal length, while *Myobia musculi* has a single empodial claw.



***Radfordia ensifera***: Again, although this is considered a rat fur mite, it can infest mice as well. *R. ensifera* is morphologically and biologically similar to *R. affinis* (and also to *Myobia musculi*). The two *Radfordia* spp. can be differentiated by scrutiny of the tarsal terminus of the second pair of legs. *Radfordia affinis* has two tarsal claws of unequal length, while *Radfordia ensifera* has two tarsal claws of equal length.



## Ectoparasites

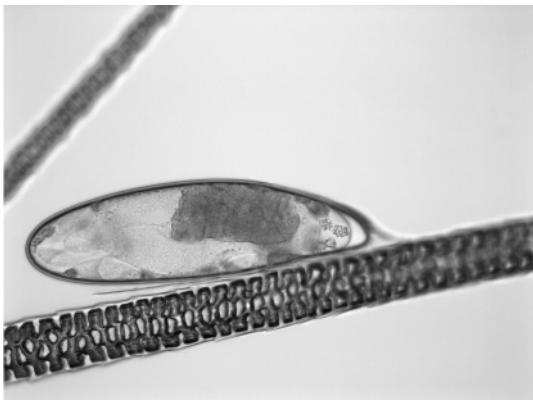
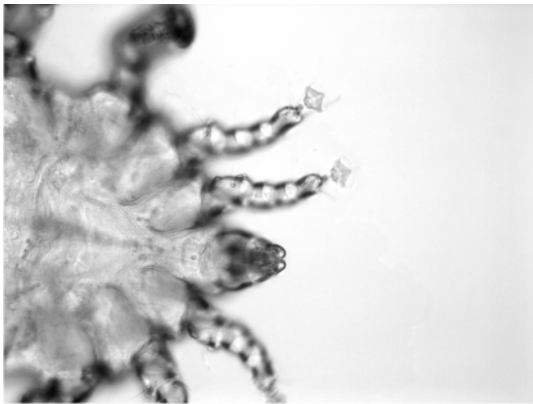


***Ornithonyssus bacoti***: This mite is known as “the tropical rat mite”. Other mites feed on serum, but *O. bacoti* is a bloodsucking mite. It is not always present on animals, instead living in the bedding or on cage furnishings and only attaching to the host for a blood meal. This mite can infest humans. Female mites are 750  $\mu\text{m}$  long, and white or tan. When engorged, it is black or dark red and can reach 1 mm in length.

Photograph used by permission of Dr. Joan Cole



***Myocoptes musculus***: Adult females measure 300  $\mu$  to 380  $\mu$  long by 130  $\mu$  wide, while adult males are 160  $\mu$  to 210  $\mu$ . *Myocoptes* are usually identified by the distinctive morphology of the 3rd and 4th legs. In females, the legs are heavily chitinized and modified to clasp the hairs of the host. In males, the 3rd pair of legs resembles those of the females, while the 4th pair is enlarged and oriented caudally. Eggs are 200 x 45  $\mu$  and are attached to more proximal portions of the hair shaft when compared to *Myobia*.



## Endoparasites: *Metazoa*

Of the metazoan endoparasites listed below, the pinworms (*Aspiculuris* and *Syphacia*) are by far the most common in laboratory rats and mice. Other parasites, such as whipworms or tapeworms, are possible, especially if animals have been exposed to intermediate hosts (insects) or wild or feral rodents.



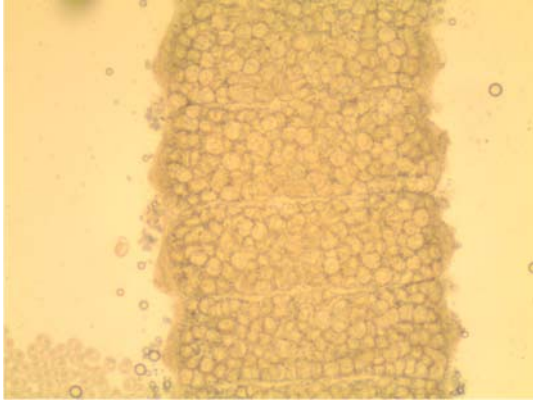
***Aspiculuris tetraaptera*:** This oxyurid parasite of mice is 3-4 mm long, and 215-275  $\mu\text{m}$  wide. Males are 2-4 mm long and 120-190  $\mu\text{m}$  wide. Females have wide cervical alae and an oval esophageal bulb. Eggs are ellipsoid with a thin shell and the embryo does not fill the egg. Eggs measure 70-98  $\mu\text{m}$  x 29-50  $\mu\text{m}$ .



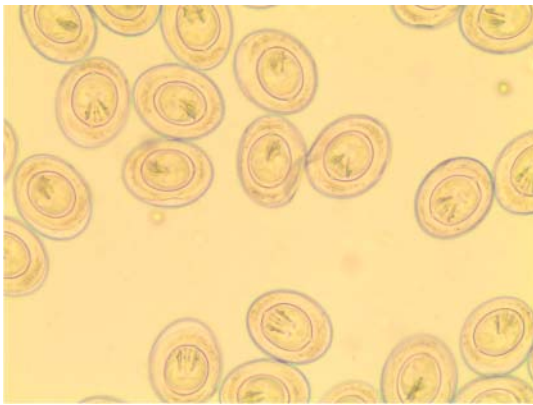
***Syphacia obvelata*:** *S. obvelata* typically infects mice, but has been found in other species. Adult females measure 240  $\mu$  to 400  $\mu$  wide. Adult males measure 1.1 mm to 1.5 mm long by 120  $\mu$  to 140  $\mu$  wide. They are distinguished from *Aspiculuris* by the small cervical alae and the round esophageal bulb. Eggs are thin-shelled, unembryonated, crescent shaped, and flattened on one side. Eggs measure 111  $\mu$  to 153  $\mu$  long by 33  $\mu$  to 55  $\mu$  wide.



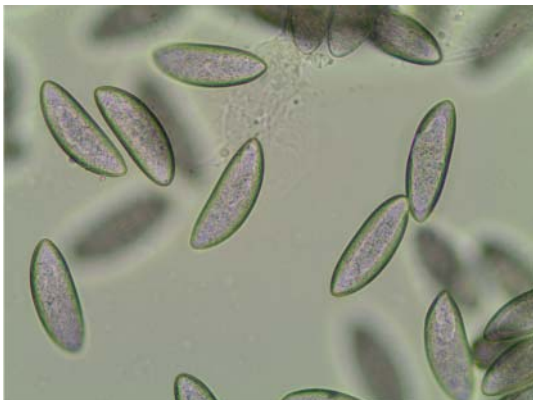
## Endoparasites: *Metazoa*



***Hymenolepis diminuta***: Adult worm measures 20 mm to 60 mm in length and 3 mm to 4mm in width. Pear-shaped scolex bearing four deep suckers, but no hooks. The eggs are almost spherical, measure  $62\ \mu$  to  $88\ \mu$  by  $52\ \mu$  to  $81\ \mu$ , and contain an embryo which possesses three pairs of small hooks and lacks polar filaments.



***Syphacia muris***: Common rat pinworm. Adult females measure 3.4 -5.8 mm long and  $100\ \mu$  wide. Adult males measure  $2,800\ \mu$  to  $4,000\ \mu$  long. The mouth is surrounded by three simple lips. Eggs are ellipsoid, flattened on one side, and measure  $72\ \mu$  to  $82\ \mu$  long by  $25\ \mu$  to  $36\ \mu$ .

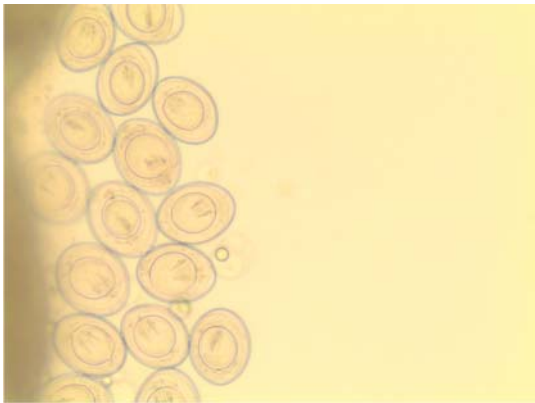




## Endoparasites: *Metazoa*

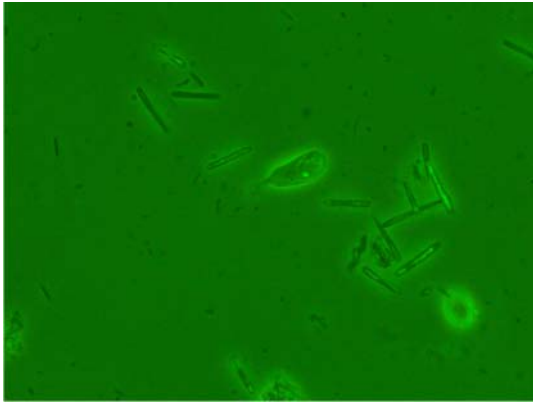


***Rodentolepis nana***: Known as the “dwarf” tapeworm. Adult worm measures 25 mm to 40 mm in length and less than 1 mm in wide. The scolex bears four unarmed suckers, and the rostellum is armed with a single ring of 20-27 small hooklets. Mature proglottids are wider than long and trapezoidal. The egg is oval and measures  $44\ \mu$  to  $62\ \mu$  by  $30\ \mu$  to  $55\ \mu$ . The embryo is spherical and thin-walled with a knob at each pole, from which six fine filaments emerge. The onchosphere possesses three pairs of small hooks.

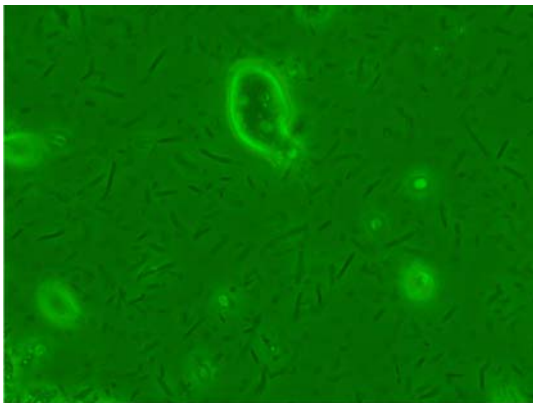


## Endoparasites: Protozoa

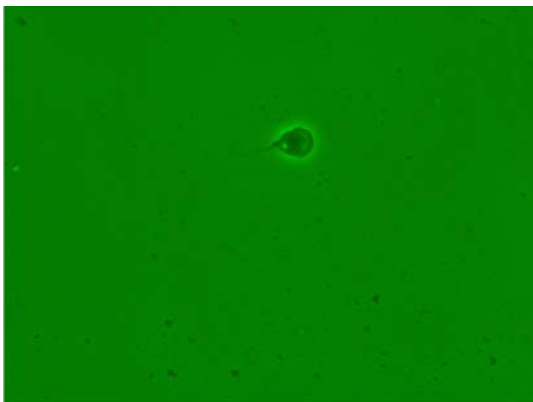
Excellent line drawings and detailed descriptions of protozoa, including many not mentioned here, can be found in Flynn's *Parasites of Laboratory Animals*.



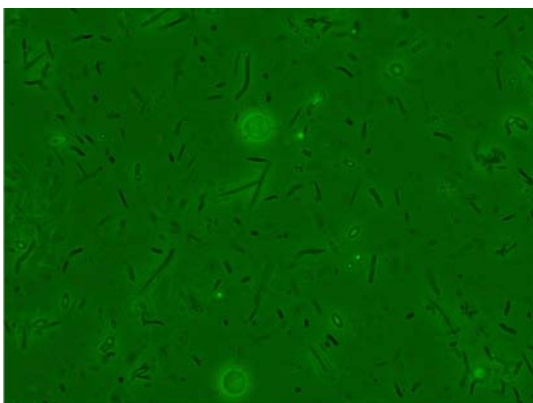
***Chilomastix bettencourti*:** Occurs in the cecum of mice and rats. This protozoan is generally considered non-pathogenic. Trophozoites measure 8.3  $\mu\text{m}$  to 20.9  $\mu\text{m}$  long by 6.6  $\mu\text{m}$  to 8.4  $\mu\text{m}$  wide. They are pyriform and possess three anterior flagella. These protozoa have an anterior cytosomal groove that can be quite prominent. The cysts are usually lemon-shaped and contain one nucleus and the organelles of the trophozoite.



***Entamoeba muris*:** Occurs in the cecum. Generally considered nonpathogenic. Multinucleated trophozoites measure 25-30  $\mu\text{m}$  in diameter. *Entamoeba* trophozoites may be seen to form pseudopodia although they may not be motile. If *Entamoeba* trophozoites are suspected, infection should always be confirmed by verifying the presence of cysts. *E. muris* cysts are round, measure 9 - 20  $\mu\text{m}$  in diameter and contain 8 nuclei.

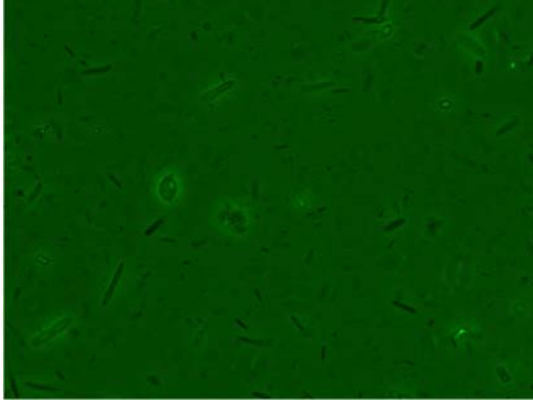


***Giardia muris*:** *G. muris* measures 7 -13  $\mu\text{m}$  long and 5 - 10  $\mu\text{m}$  wide. This protozoan may be found in the proximal portion of the small intestine. Trophozoites have a broadly rounded anterior end and 8 flagella emerging at different locations. Two slender axostyles emerge from the posterior end. The widely-described "owl eyes" appearance of *Giardia* spp. is due to a pair of darkly-staining median bodies. Movement is characterized by a cupping motion, rotating side to side as the cup flexes. *Giardia* is considered a pathogenic protozoan, although most infections do not result in clinical signs.

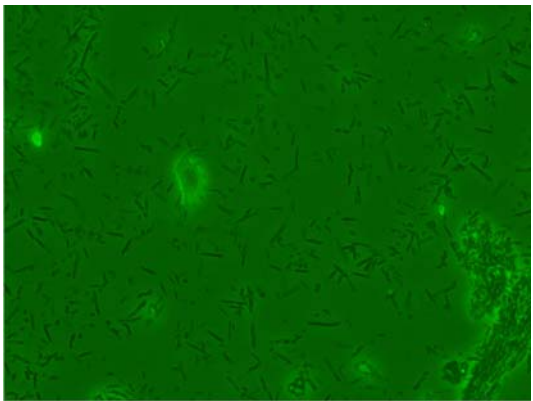


***Hexamastix* sp.:** Trophozoites measure 3.8  $\mu\text{m}$  to 10  $\mu\text{m}$  long (which includes the protruding axostyle) by 3.3  $\mu\text{m}$  to 4.7  $\mu\text{m}$  wide. Trophozoite has an anterior nucleus and cytostome, a conspicuous axostyle, a prominent parabasal body, five anterior flagella, and a trailing flagellum. Does not encyst. Considered nonpathogenic.

## Endoparasites: Protozoa



**Retortamonas spp.:** Trophozoites are pyriform or fusiform and are drawn out posteriorly with a posteriorly directed trailing flagellum. Measures  $4\ \mu\text{m}$  to  $7\ \mu\text{m}$  long by  $2.4\ \mu\text{m}$  to  $3.2\ \mu\text{m}$  wide. Protozoans are often dark with lighter spotted areas. Their motility is characterized by fast, continuous spiral movement. Considered nonpathogenic.



**Trichomonads:** (*Tritrichomonas muris* as the most commonly seen spp.) Trophozoites of this common parasite may be found in the cecum, colon, and small intestine. They measure  $16\ \mu\text{m}$  –  $26\ \mu\text{m}$  long by  $10\ \mu\text{m}$  –  $14\ \mu\text{m}$  wide. It has an three anterior flagella and a posterior flagellum. Trichomonads have an undulating membrane, easily seen under the microscope, that helps differentiate them from other protozoans.

**Spironucleus muris:** Primarily found in the duodenal mucosa of mice and rats. Measure  $7\ \mu\text{m}$  –  $9\ \mu\text{m}$  long and  $2\ \mu\text{m}$  –  $3\ \mu\text{m}$  wide. Trophozoites are shaped like elongated pears. Two sets of four flagella emerge from the anterior end, one set on each side of the trophozoite. For each anterior set, one flagellum passes through the body to emerge as a trailing flagellum. The cyst is ovoid and measures  $7.4\ \mu\text{m}$  x  $4.0\ \mu\text{m}$ . Protozoans will move very quickly through the field of view. This protozoan is considered pathogenic.