**Anisakis spp.**

a. Several intermediate hosts:
   1. Usually marine mammals.
   2. Also bears and humans.

b. Larvae have a tendency to migrate and imbed in tissue.
   1. Especially stomach and gums.
**Heterakis gallinarum**
a. Intestinal worm of fowl
1. Recognized by sharp tail, often with sucker.
2. Eggs shed into soil, larvae eaten by earthworms.
   a. Also eaten by birds.
3. Birds eat earthworms and get adults
   b. Vector for *Histomonas*.
1. Protozoan eaten by worm, protozoan multiplies in ovaries.
2. Gets into eggs, and thereby infects birds

The principal economic importance of caecal worms lie in their role as a carrier of blackhead, caused by the protozoan *Histomonas meleagridis*. It is passed via the worm eggs in the faecal material of infected birds. It remains viable in the eggs of the caecal worm and occurs in the caecum and liver of young turkeys, partridges and occasionally of chickens. Blackhead develops 2 to 3 weeks after ingestion of the worm eggs.
Oxyurids
A. Generally small worms with nearly spherical enlargement of esophagus.
1. Males with single copulatory spicule.
2. Parasites of large intestine.

Oxyurids
B. Eggs are distinctive.
1. Flat on one side.

Oxyurids
Females oviposit outside of anus, sometimes even exploding on contact with air.
**The Life Cycle of Enterobius Vermicularis (The Human Pinworm)**

Humans are infected when they ingest eggs containing infective larvae. Eggs are passed in the feces, typically during the early morning. The eggs hatch in the perianal skin, releasing larvae that penetrate the skin and migrate to the bladder, urethra, or rectum. Eggs become infective within 12 hours.

Parasites and Parasitological Resources
Butt It Itches

The pinworm is a parasite
That makes a journey every night,
from the intestine where it resides
to lay its eggs on the outside.

The usual symptom’s an itchy bottom
though in the appendix it can cause a problem.
It generally lives in tiny tots
but can infect both moms and pops.
Its thin walled eggs float in the air
so they can end up anywhere.
So if tonight you start to squirm,
remember it might be this worm.
But, this nematode’s easy to diagnose
By affixing scotch tape to the host;
then examining the microscope slide
for eggs that are flatter on one side.

And if you have him, don’t be embarrassed.
Anyone can have Enterobius vermicularis.

Order Spirurida

Characteristics:
1. Adults with pseudolabia, or with lips
(or not!).
2. Esophagus with anterior muscular portion,
   posterior glandular portion; never a bulb.
3. J1-J3 in arthropod hosts; J4-adult in intestine
   or deep tissue.
Family Gnathostomatidae

a. *Gnathostoma* spp.
   1. Carried by several hosts before infecting humans or other carnivores.
   2. Forms cutaneous lumps, but can cause worse.
Family Spirocercidae

a. *Spirocera lupi*

1. Encysts in esophagus of dogs.
2. Can cause cancer.
Superfamily Filaroidea
Characteristics
1. Adults are tissue dwelling forms
2. Often vectored by biting insects
   a. J3s deposited on skin
   b. They crawl into wound and enter tissues.

Family Onchocercidae
1. *Wuchereria bancrofti*
   a. Vectored by several genera of mosquito.
   1. *Aedes, Anopheles, Culex*, can support filariae
   2. But do not always transmit it
2. *Brugia malayi*
   a. Similar to *W. bancrofti*
   b. Spread by mosquitos (Culex)
   c. primarily in South Pacific

Family **Onchocercidae**

3. *Onchocerca volvulus*
   a. responsible for river blindness in Africa and SA
   b. Vectored by *Simulium*
**Onchocerca volvulus**

a. Life Cycle

1. Host with adult worms in sheathes in skin
2. Microfilariae remain in skin where they are ingested by blackflies

3. Microfilariae migrate to thoracic muscles of fly
4. Develop into J1 and then J2 (sausage stage)
5. Become filariform J3s (infective)
6. J3s transferred in fly bite
Onchocerca volvulus

c. Microfilariae invade cornea and after death cause scarring;
d. Wolbachia bacteria in worms seems to be responsible.

Onchocerca volvulus

1. Invasion of lymphatic system can also cause elephantiasis, particularly in genitalia and mammary glands.

A Note On Microfilaria

Your book states (p. 447), that microfilaria are not as differentiated as normal J1 larvae and hence are not to be considered as such.

The J1 stage does not develop until they are within the insect vector’s stomach; after 8 more days, they molt to J2s and after another 4 days molt to slender J3 larvae.

These are the infective filariform larvae that leave the insect and enter the definitive host during a bite.
A Note On “Bursate Rhabditidians”

There may have been some confusion over the orders of Secernentea we mentioned in class. Those mentioned were: Rhabditida, Strongylida, Ascarida, Oxyurida and Spirurida.

A mislabeled slide in Lecture 21 may have given you the impression that what your book calls “bursate rhabditidians” belong within the Order Rhabditida. They DO NOT. They are actually part of the Order Strongylida, which includes the hookworms, Trichostrongylines and Metastrongylines.

The Order Rhabditida include the lungworm Rhabdiasias, and the intestinal worm, Strongyloides.