Ascaridida
Ascaridoidea*
Heterakoidea*
Cosmocercoidea
Subuluroidea
Seuratoidea
Ascaridoidea

- Parasites in intestine of all classes of vertebrates. Aquatic cycles use invertebrate and vertebrate (fish) intermediate hosts; terrestrial cycles use vertebrate intermediates; some such as *Ascaris, Parascaris, Belascaris*, are monoxenous.
Monoxenous ascaridoids are secondarily derived from heteroxenous forms.

1 = Infective Stage
\( \Delta \) = Diagnostic Stage

1. Fertilized egg
2. Unfertilized egg will not undergo biological development.

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Immunopathology in *Ascaris*

- As in most helminths, *Ascaris* infection provokes a polarized Th-2 response.
- JaK-Stat signalling of B-cells with IL-4 leads to IgE production. IgE attaches to mast cells in gut. On reexposure antigen can cross link IgE on mast cells leading to degranulation which triggers inflammatory response.
Other Ascaridoides of importance to humans.

• *Anisakis spp.*, parasites in stomach and intestine of Pinnipeds, Cetaceans

• *Pseudoterranov*a *decipiens*, parasites in stomach/intestine of Pinnipeds.

• Both groups have life cycles involving host food chains: copepods-amphipods-fish-seal; euphausid shrimp-whale.
Ascaridoids cont’d

• *Toxocara canis, T. cati*: common parasites of household pets. Infection may occur by:
  - Eating infected prey
  - Eating infective eggs
  - Transplacental
  - Transmammary

Young Vs adult hosts
Spirurida

• Largest and most diverse order of parasitic nematodes. All use arthropod intermediates.

• 2 suborders:
  - Camallanina: use crustacean intermediates
  - Spirurina: use crustaceans or insect intermediates.
Camallanus spp

- Parasites in intestine of fish and amphibia.
- Pathogen *C. cotti*, parasite of freshwater fish in SE Asia, disseminated throughout world by tropical fish trade.
Dracunculoidea

- Parasites of fish, turtles, birds, mammals. Copepod intermediate
- *Dracunculus medinensis* occurs in man. A serious pathogen that could be controlled through inexpensive community-based approach.
Spirurina

• 10 + superfamilies distributed in all classes of vertebrates (mostly terrestrial).

• Most important human pathogens are members of the Filarioidea: e.g. *Brugia pahangi*, *B. malayi*, *Wuchereria bancroftia*, *Onchocerca volvulus*, *Loa loa*
Filarioidea

• Occur in extraintestinal sites in all classes of terrestrial vertebrates (not in fish).
• Use haematophagous arthropods for transmission.
• 2 families: Filariiidae (2 subfamilies, 15 spp.) and Onchocercidae (8 subfamilies, 80 spp.)
Onchocerca spp.

- Adults occur in subcutaneous tissues of grazing mammals and man.
- Microfilaria occur in skin but often remote from location of adults.
- Transmission by blackflies (Simuliidae)
Blackfly vector needs highly oxygenated water (fast flowing streams).

Slave trade involve in introduction to the Americas.
Pathogenesis

• Adults elicit little response, nor do intact skin microfiliaria which accumulate in face and conjunctiva of the eyes. But when microfiliaria die they provoke a strong keratitis and thickening of conjunctiva leading to blindness.

• Pathology associated with Wolbachia sp., an endosymbiont of Onchocerca, and acts through stimulation of TLR4 receptor by LPS.
Brugia and Wuchereria

• Adults in lymphatics of Primates, Carnivores, Shrews, and Lagomorphs.
• Microfilaria (sheathed) occur in blood and typically show marked circadian periodicity in numbers.
• Have Wolbachia symbionts that appear to modulate the pathology of infection.
Pathogenesis

• Intact worms (adults or microfilariae) not a problem but with chronic infection host exposed to antigens released from dead worms including *Wolbachia* antigen. Resultant reaction to antigens leads to blocked lymphatics, scarring and other effects.
Pathogenesis

• Treat with antihelminthic—leads to increased lesions although it kills the worms!
• Treatment with Tetracycline leads to death of Wolbachia and its worms host.
• Current model uses Mongolia jirds (gerbils) which show little reduction in lesions even after Tetracycline treatment.
Loa loa

Fly Stages:
1. Fly (genus Chrysops) takes a blood meal (L3 larvae enter bite wound)
2. Migrate to head and fly's proboscis
3. L3 larvae
4. L1 larvae
5. Microfilariae shed sheaths, penetrate fly's midgut, and migrate to thoracic muscles
6. Fly takes a blood meal (ingests microfilariae)
7. Adults in subcutaneous tissue
8. Adults produce sheathed microfilariae that are found in spinal fluid, urine, sputum, peripheral blood and in the lungs

Human Stages:
1. Infective Stage
2. Diagnostic Stage

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